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To be pasted into MCZ copy of Holbrook's Ichth. S.C.
no. list 191 (1960)

ONE OF THE RAREST AMERICAN COLOR PLATE BOOKS

(1794-1871)

Holbrook, John Edwards. Ichthyology of South Carolina. 2 leaves, 182 pp., blank leaf. With 27 hand colored lithographic plates. 4to. Contemp. half morocco. (Rebacked).

Charleston, S.C., John Russell, 1855-(1857?).

\$1,250.00

A fine copy of the First Complete Edition - one of a few surviving copies. The plates each bear pictures of two fishes, in striking natural colors, along with small black and white figures of their scales, an invaluable help in identifying the various species.

The publishing history of this work, extending as it does from 1845 (?) to 1860, is quite complicated. Holbrook first planned a work entitled Southern Ichthyology, which was to be issued in parts. Only one copy of the second (and last) part issued is recorded as surviving (Crerar Library, Chicago), and the LC Catalogue states that part 1 was never issued. In the preface to the present work, Holbrook states that two parts were issued, but, in any event, publication was not completed.

In 1855, publication of the present work began, to be completed, as the author says, in "a year or 18 months". A few copies had been distributed when a fire in Philadelphia destroyed both the original drawings and the stock of completed plates. Holbrook had to make new drawings and reprint the work completely for publication in 1860 (with one more plate than in the present edition), at which time he recalled all copies of the 1855 - (1857?) edition. The LC Union Catalogue records only four copies of the latter (N.Y. State Library, Yale, Western Reserve, and Acad. Nat. Sciences, Philadelphia), and no copy has appeared at auction in recent years. Bennett describes only the 1860 edition, and seems never to have seen a copy of the 1855-(1857?) edition. Nissen incorrectly states that the 1855-(1857?) edition was without plates - he probably had seen a stray copy which had been circulated after the plates were destroyed.

See illustration on back cover.

Sabin 32452; see also Nissen, Schoene Fischbuecher, no. 77; Bennett, Practical Guide to American 19th Cent. Color Plate Books, p. 56.

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ICHTHYOLOGY
OF
SOUTH CAROLINA.

BY JOHN EDWARDS HOLBROOK, M. D.,

PROFESSOR OF ANATOMY IN THE MEDICAL COLLEGE OF THE STATE OF SOUTH CAROLINA; MEMBER
OF THE ROYAL MEDICAL SOCIETY OF EDINBURGH; OF THE ROYAL SOCIETY OF NORTHERN
ANTIQUARIES, COPENHAGEN; OF THE SOCIETY OF NATURFORSCHENDE FREUNDE, BERLIN;
CORRESPONDING MEMBER OF THE AMERICAN PHILOSOPHICAL SOCIETY; OF THE
AMERICAN ACADEMY OF ARTS AND SCIENCES; OF THE ACADEMY OF NATURAL
SCIENCES OF PHILADELPHIA; OF THE NEW YORK LYCEUM OF NATURAL
HISTORY; AND OF THE BOSTON NATURAL HISTORY SOCIETY.

CHARLESTON, S. C.:
PUBLISHED BY JOHN RUSSELL.

1855.

c

CAMBRIDGE :
METCALF AND COMPANY, PRINTERS TO THE UNIVERSITY.

NOTICE.

It must be here stated, that much of this work now offered to the Public was printed several years since: indeed two numbers were published under another title in 1845: some few pages have been reprinted, and new matter added. So much it is necessary to say, to account for the apparent negligence in not referring to late works on Ichthyology.

Notwithstanding the great delay in the publication of this work, it is now so far advanced that it will be printed in a year or eighteen months. In a succeeding number will be given some account of the anatomy of Fishes, and of the terms made use of in description.

THE AUTHOR.

*Medical College of the State of South Carolina, }
November 10th, 1854. }*

ICHTHYOLOGY

OF

SOUTH CAROLINA.

FAMILY PERCIDÆ. — *Cuvier.*

CHARACTERS. Body elongated, more or less compressed, and covered with adherent scales, generally hard, with their exposed surfaces roughened, and their free posterior margin ciliated or serrated; opercular bones serrated or spinous; jaws not cuirassed; superior margin of the mouth formed by the inter-maxillaries; teeth on the inter-maxillaries, the inferior maxillary, vomer, palate, and pharyngeal bones; these teeth are brush-like in some, in others they are conical, and are more or less developed; tongue in some smooth, in others armed with minute teeth; dorsal fin single or double; anterior part spinous; ventral fins mostly thoracic; no barbels at the chin.

GENUS PERCA. — *Lin., Cuvier.*

CHARACTERS. Body elongated, sub-compressed; inter-maxillary, inferior maxillary, vomerine, palatine, and pharyngeal teeth villiform, equal; tongue smooth; internal surface of the branchial arches armed with minute teeth; two dorsal fins, distinct, separated, anterior spinous; free margin of the pre-opercle serrated; opercle ends in a flattened point; branchial rays seven.

PERCA FLAVESCENS. — *Mitchill*.*Plate I. Fig. 1.*

SPECIFIC CHARACTERS. Body above dusky tinted greenish-yellow, below golden; belly white; six or eight dark, vertical bands descend from the back and disappear at the belly; ventral and anal fins orange-colour; tongue smooth. D. 13 – 1 – 13. P. 15. V. 1 – 5. A. 2 – 8. C. 17.

- SYNONYMES. *Morone flavescens*, *Mitch.*, Report in part, &c.
Bodianus flavescens, *Mitch.*, Trans. Lit. and Phil. Soc. N. Y., vol. i. p. 421.
Perca flavescens, *Cuv.*, Reg. An., tom. ii. p. 133.
Perca flavescens, *Cuv. et Val.*, Hist. Nat. Poiss., tom. ii. p. 46.
Perca acuta, *Cuv. et Val.*, Hist. Nat. Poiss., tom. ii. p. 49, pl. 10.
Perca granulata, *Cuv. et Val.*, Hist. Nat. Poiss., tom. ii. p. 48, pl. 9.
Perca serrato-grnulata, *Cuv. et Val.*, Hist. Nat. Poiss., tom. ii. p. 47.
Perca gracilis, *Cuv. et Val.*, Hist. Nat. Poiss., tom. ii. p. 50.
Perca flavescens, *Rich.*, Faun. Boreal. Am., iii. p. 1, pl. 74.
Perca acuta, *Rich.*, Faun. Boreal. Am., iii. p. 4.
Perca gracilis, *Rich.*, Faun. Boreal. Am., iii. p. 4.
Perca flavescens, *Storer*, Report, &c., p. 5.
Perca flavescens, *DeKay*, Zoöl. N. Y., part iii. p. 3, pl. 1, fig. 1.
Perca granulata, *DeKay*, Zoöl. N. Y., part iii. p. 5, pl. 48, fig. 220.
Perca serrato-grnulata, *DeKay*, Zoöl. N. Y., part iii. p. 5.
Perca acuta, *DeKay*, Zoöl. N. Y., part iii., p. 6.
Perca gracilis, *DeKay*, Zoöl. N. Y., part iii. p. 6.
Perca flavescens, *Ayres*, Bost. Jour. Nat. Hist., vol. iv. p. 250.
Perca flavescens, *Kirt.*, Bost. Jour. Nat. Hist., vol. v. p. 337.
Perca flavescens, *Storer*, Synops., p. 17.
 Red-finned Perch, *Vulgo*.

DESCRIPTION. The form of this fish is elongated, moderately compressed, with the dorsal outline arched, and somewhat gibbous in front of the dorsal fin, and the ventral outline nearly straight. The head is large, sub-depressed above, or so flattened as to make the facial outline slightly concave; and the snout is full and rounded. The anterior nostril, which is the smaller of the two, is round, and

placed midway between the eye and snout; the posterior is oval, and both are on a line within the orbit. The eye is very large, and is longest in the horizontal direction; its posterior margin is equidistant between the angle of the opercle and the snout, and its inferior margin is about the median plane of the head; the lower jaw, though apparently longer than the upper when the mouth is open, is in fact shorter, and received within it when the mouth is shut.

The mouth is large, though the posterior margin of the upper jaw scarcely extends beyond the orbit; the upper jaw, the margin of which is made up entirely of the inter-maxillary, is armed with a large band of rough, villiform, equal teeth, and the inferior maxillary has a narrower band of similar teeth; there is a narrow chevron-like group on the anterior extremity of the vomer, and a more slender band on each palatine, as well as a few minute teeth on the transverse bones, where they join the vomer; the internal faces of the branchial arches are furnished with rows of minute teeth, and the pharyngeal bones are armed in a similar manner; the tongue is thin, rounded in front, smooth, and tolerably free. There are seven branchial rays.

The pre-opercle is rounded at its angle, and is serrated in nearly its whole free margin, both behind and below, where the serratures are largest and directed forward; it is naked or uncovered with scales. The opercle is sub-triangular, pointed and spinous behind, with its upper side rounded; it is naked or without scales on its lower half, which is marked with radiating striæ more or less distinct. The sub-opercle is sub-triangular, with its apex behind and its inferior border rounded and serrated, and is covered with scales. The inter-opercle is broad, and rounded below. The head above in front of the eye is smooth; the cheeks are covered with scales.

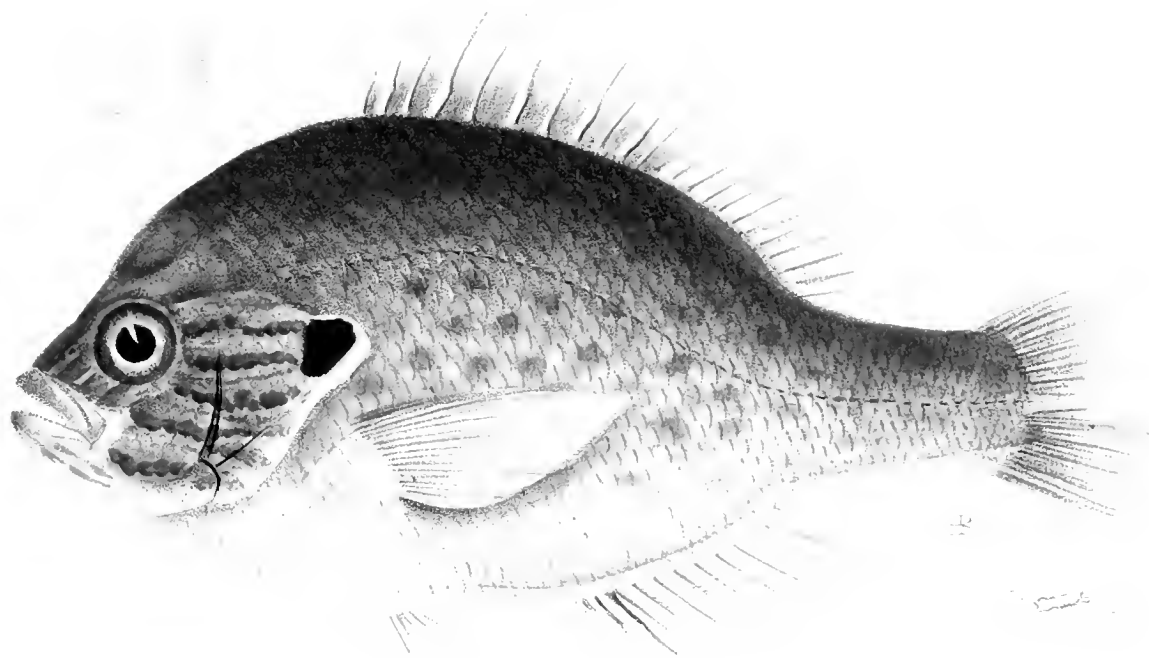
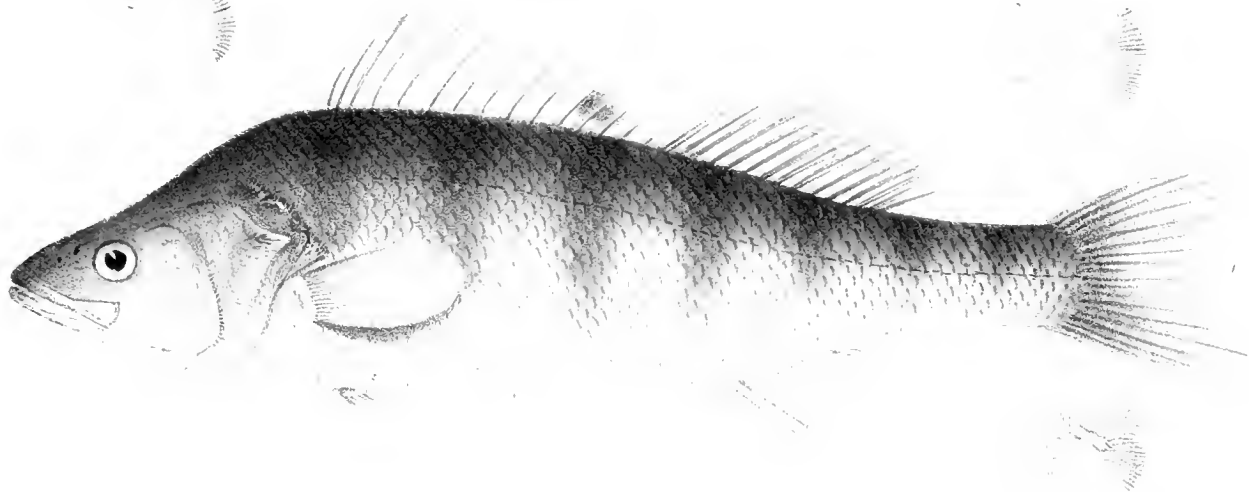
The dorsal fin is double, or is so deeply cleft as to appear so, the connecting membrane between the two portions being so slightly elevated. The anterior is long, and is equal in elevation to more than half the height of the body; it begins just behind the opercle, and has sixteen spines, partially received in a groove when the fin is closed; of these spines the first is short, and the third,

fourth, fifth, and sixth are longest. The second or posterior dorsal is shorter and less elevated than the anterior; it arises rather in front of the anus, and has two spines, the anterior very short, and fifteen branched rays. The pectoral begins nearly in a line vertical with the spine of the opercle, and extends to the root of the ninth dorsal spine; it is broad, rounded behind, and has fourteen rays. The ventral arises near the anterior fourth of the pectoral, and extends one fourth of its length behind it; it has one long spine and five soft rays. The anal begins in a line with the root of the sixth dorsal soft ray, and terminates with the dorsal fin behind; it has two spines and nine branched rays. The caudal fin is large, sub-crescentic, with its horns broad and rounded; it has seventeen rays, and is covered with a few scales both above and below. The scales are small, very adherent, unguiform, rounded and ciliated behind, serrated in front, and marked with seven radiating lines. The lateral line begins near the supra-scapular, and runs about the superior fourth of the body and concurrently with the dorsal outline as far as the middle of the second dorsal fin, when it descends to the median plane, and thus is continued; its scale has the duct nearly in the middle.

COLOUR. The back above is more or less dusky, and tinted with green; the sides are golden-yellow, and the belly white; six or eight vertical dusky bars descend from the back on the sides, but they disappear at the belly; the membrane of the anterior dorsal fin is transparent, more or less clouded, and has a dusky spot near its posterior extremity; the pectoral is transparent; the rays of the ventral are orange-colour, but the membrane is transparent; the anal is orange.

DIMENSIONS. The length, from the opercle to the tip of the caudal fin, is equal to three heads and a half; the greatest elevation without the dorsal fin, to one head; total length, twelve inches.

SPLANCHNOLOGY. The peritoneum is thin and of a silvery colour. The stomach is very large, and when distended with food it fills nearly the whole cavity of the abdomen; its walls are thin. The pyloric branch is exceedingly small and short, though it has thick walls; it departs from the stomach near its middle. The small intestine is larger and more capacious than the pyloric branch of the stomach; it runs first towards the vent, is then reflected to the pylorus, whence it returns to end in the rectum, which is long, slender, and has a very prominent valve; there are three



large, short cœcal appendages. The liver is small, and seems but a single mass, as there are no marks of separation into lobes. The spleen is short, flattened, narrow, and of a very dark colour. The air-bladder is large, and extends the whole length of the abdominal cavity; it is of a conical shape, broad in front, and pointed behind, with a beautiful vascular ganglion on its inferior surface within. The ovaries are large, and united closely together behind. The kidneys are large, but the urinary bladder is small.

HABITS. The Perch is a voracious animal, although its teeth are but small; it is solitary in its habits, for even in ponds and rivers, when most abundant, it is never seen in *shoals*, like many other fish, but each one seeks its own dwelling-place. In cold weather it is found in deep water, but in the summer months it may be seen swimming slowly, and most generally against the current of the stream; suddenly it stops and remains stationary for a minute or two, and often in a position almost perpendicular, with its head near the ground, as if seeking nourishment; it now suddenly darts forward, swims rapidly for some distance, and then again comes to a stand. In July and August it approaches the surface, allured, doubtless, by grasshoppers and such other insects as may fall into the water; and at this time it rises to the fly, though in general it is baited with worms. The flesh is white, firm, and delicate, and is much esteemed.

GEOGRAPHICAL DISTRIBUTION. This fish has a very widely extended geographical range. It has been observed in nearly all the Atlantic States; in the great Northern lakes; and, according to Professor J. P. Kirtland, of Cleaveland, it has lately found its way into the tributaries of the Ohio River.*

GENERAL REMARKS. Previous to the time of Cuvier, all ichthyologists supposed the *American Perch* to be identical with, or at least a simple variety of, the *European*, so great is the resemblance between them; Cuvier, however, not only proved it to be a distinct species, but went still further, and described the several varieties of the *American Perch* as so many different species; and in this he has been followed by several naturalists. But it should be remembered that those fishes that are common to a geographical region of great extent are subject to individual variations, which can only be recognized by a comparison

* Bost. Journ. Nat. Hist., vol. v. p. 337.

of many individuals, and from very distant places; then we shall see, as in the animal now under consideration, that a "snout more pointed, a head more wrinkled, or dentations of the opercular bones equally marked, are not constant characters." Dr. Storer, in his Synopsis of the Fishes of North America, was the first who referred all the known varieties or supposed species to the *Perca flavescens*.

GENUS POMOTIS. — *Cuvier*.

CHARACTERS. Pre-opercle more or less denticulated; inter-maxillary, vomerine, inferior maxillary, and pharyngeal teeth; tongue and palate-bones smooth or without teeth; a membranous appendix at the angle of the opercle; branchial rays six.

POMOTIS VULGARIS. — *Cuvier*.

Plate I. Fig. 2.

SPECIFIC CHARACTERS. Body sub-ovoid; brown, with a greenish tint above, and with brazen or yellow tints and spots below; head dusky above, with pale-blue waving horizontal lines on the opercle and pre-opercle; opercular appendix dark, with a bright red blotch on its inferior posterior margin. D. 10 – 11. P. 13. V. 1 – 5. A. 3 – 10. C. 17.

- SYNONYMES. *Perca fluviatilis gibbosa ventre luteo*, *Catesby*, Carolina, &c., vol. ii. p. 8.
Labrus auritus, *Mitch.*, Trans. Lit. and Phil. Soc. N. Y., vol. i. p. 403.
Pomotis vulgaris, *Cuv. et Val.*, Hist. Nat. Poiss., tom. iii. p. 91, pl. 49; *id.* vii. 465.
Pomotis vulgaris, *Rich.*, Faun. Boreal. Am., iii. p. 24, fig. 76.
Pomotis vulgaris, *Storer*, Report, &c., p. 11.
Pomotis vulgaris, *Kirt.*, Bost. Jour. Nat. Hist., vol. iii. p. 471, pl. 28, fig. 11.
Pomotis vulgaris, *DeKay*, Zoöl. N. Y., part iii. p. 31, pl. 51, fig. 166.
Pomotis vulgaris, *Ayres*, Bost. Jour. Nat. Hist., vol. iv. p. 258.
Pomotis vulgaris, *Agassiz*, Lake Superior, p. 293.
Pomotis vulgaris, *Storer*, Synops., p. 40.
 Perch or Sun-fish, *Vulgo*.

DESCRIPTION. This fish is of an ovoidal form, convex above and below, but straighter and thicker at the belly. The head is large, broad, though not thicker than the rest of the body; it is smooth between the eyes and snout, which is full and rounded. The eye is large, and is placed with its inferior margin above the median plane of the head, and about one diameter of its orbit from the snout, and two and a half diameters from the extremity of the opercle; the pupil is dusky with a black tint, and the iris is brazen. The nostrils are rather nearer the mesial line than the orbit, and the upper is about the median plane of the eye; both are round, but the posterior is the larger.

The mouth is rather small, very protractile; the lower jaw is slightly the longer, and both have very thin lips. The inter-maxillary is armed with a broad group of small, pointed, thickly set, card-like teeth, with an outer row of conical, pointed teeth, of much greater size, and nearly all of the same length; the lower jaw has similar teeth; the anterior superior as well as the posterior pharyngeal bones are small; the former are armed with a few small, pointed teeth, the latter are covered with minute villiform teeth; the middle pharyngeals are massive and broad; they are paved with large teeth, some of which have their grinding surfaces smooth, others rounded, or slightly depressed; the inferior pharyngeals are equally large, and have similar teeth, though the grinding surfaces are here mostly flat; there are a few pointed, conical vomerine teeth. The pre-opercle is rounded and finely serrated at its angle; its surface is smooth or without scales, though it has a scalloped appearance. The opercle is broad, covered with large scales, sub-triangular, with its apex behind, from which proceeds a loose fleshy appendix. The sub-opercle is long, narrow, rounded below, rather pointed behind, and is covered with large scales. The inter-opercle is quadrilateral, broadest behind, and rounded below.

The dorsal fin is large; it begins with the posterior extremity of the opercular appendix, and has ten rather stout spines placed in a groove of scales; the soft portion of the dorsal is more elevated than the spinous, and has eleven branched rays. The pectoral begins with the termination of the opercle, or rather before it, and extends to the root of the third anal spine; it is broad,

long, and has thirteen rays. The ventral arises just behind the root of the pectoral, and terminates beyond the vent; it has one short, stiff spine, and five branched rays, the anterior slightly prolonged by a filament. The anal fin is large, elevated; it has three stout spines, the anterior short, and nine branched rays, much longer than the spines. The caudal is broad, slightly lunate, and has seventeen rays.

The scales are large, semicircular behind, and ciliated, slightly prominent before, with twelve radiating striæ. The lateral line begins at the upper margin of the opercle, and runs along the upper fourth of the body concurrent with the dorsal outline to the root of the tail, when it descends to the median plane; its scale is slightly unguiform in shape, with the duct opening near its middle.

COLOUR. The head is dusky above, with pale-blue waving lines running from the snout to the eye; the opercle, pre-opercle, and sub-opercle are also marked with five or six bands of similar colour, more or less undulating; the appendix is black, with a bright scarlet blotch on its posterior part. The body is olive-brown above, with a slight shade of green, and is marked with irregular spots of reddish-brown; the sides and belly are yellow, more or less clouded, and below the lateral line are numerous brazen spots, or at times they may be bright reddish-brown, arranged with some degree of regularity. The dorsal fin is transparent, with dusky shades and dusky spots on its soft portion; the rays of the pectoral fin are yellow, though the membrane is transparent; the ventral is transparent, but with a strong yellow tint; the anal is transparent, though it is shaded with blue in places, and has a row of yellowish or brazen spots near the origin of the rays; the caudal is semi-transparent, with dusky shades and spots; it is bordered with dirty white behind, which is well seen in water when the animal is alive.

DIMENSIONS. The length of the animal from the opercle to the tip of the tail is equal to two heads and three quarters; the elevation without the dorsal fin, to one head and a half; total length, nine inches.

SPLANCHNOLOGY. The peritoneum is silvery. The liver is large, and without subdivisions into lobes on its inferior aspect; it is placed mostly on the left side, and extends more than half the length

of the abdomen backwards. The gall-bladder is small, pyriform, and the bile is of pale colour. The stomach is broad, tolerably large, though short; the pyloric portion begins near its middle, and the sphincter at the pylorus is well marked. The small intestine is capacious, and makes several convolutions before it ends in the rectum; there are eight cæcal appendages. The air-bladder is large, broad, full in front, and slightly subdivided into pouches; it is smaller behind, and prolonged in two horns for some distance along the sides of the inter-spinal bones of the anal fin. The kidney is large, though the urinary bladder is small.

HABITS. This fish prefers the clearest waters. In the spring of the year the female prepares herself a circular nest, by removing all reeds or other dead aquatic plants from a spot of a foot or more in diameter, so as to leave bare the clean gravel or sand; this she excavates to the depth of three or four inches, and then deposits her spawn, which she watches with the greatest vigilance; and it is curious to see how carefully she guards this nest against all intruders; in every fish, even those of her own species, she sees only an enemy, and is restless and uneasy till she has driven it away from her dwelling-place. We often find groups of these nests placed near each other, along the margin of the pond or river the fish inhabits, but always in very shallow water; hence they are liable to be left dry in seasons of great drought. These curious nests are most frequently encircled by aquatic plants, forming a curtain round them, but a large space is invariably left open for the admission of light.

GEOGRAPHICAL DISTRIBUTION. The *Pomotis vulgaris* is found in the great Northern lakes, the Atlantic States from Maine to Florida; and, according to Dr. Kirtland, in the tributary ponds and streams of the Ohio River.

GENERAL REMARKS. In giving such a wide geographical range to this animal the identity of the Northern and Southern animal is presupposed, and of this identity I have little doubt, after the comparison and examination of hundreds of individuals. It is true, if we take a single Northern and a single Southern specimen for comparison, differences may be observed between them that might lead us to believe they were of different species; but in a comparison of many, these apparent differences are confounded or lost. We have then, in this instance, as in that of the *Perca flavescens*, an animal widely extended in our fresh waters, both North and South, having certain minor differences in different regions, but agreeing per-

fectly as a whole. The specific name *vulgaris* was first applied to this animal by Cuvier, and it is here retained, because I do not believe that this fish is the *Labrus auritus* of Linnæus; nor is it possible at this time to determine the animal on which he imposed this name in the tenth edition of the *Systema Naturæ*, in which it first appears, for his description is short,—his sole reference is to the Museum of De Geer, — and his “habitat” Pennsylvania. The *Labrus auritus* of the twelfth edition is a different animal, for here the “opercula apice membranaceo, elongato nigro,” first appears; and this description may possibly apply to one of the two succeeding species, for in 1772, four years before the publication of that work, Dr. Garden sent the Swedish naturalist, among other things, the dried skins of two fishes, “Fresh-water Red-bellied Trout” and “Fresh-water Bream.” Now each of these has a black, elongated, fleshy auricular appendage, which exists in none other of our fishes. Linnæus, however, receiving these fishes from the very scene of Catesby’s labours, refers to the plate “*Perca fluvialilis gibbosa*,” &c. of that author, not with certainty, but with doubt, and in his description he does not speak of the red spot at the opercle which Catesby says “distinguishes his fish from all others”; so it appears to me certain that the specific name *auritus* was not applied to the animal now under consideration, but to some other at present unknown.

POMOTIS RUBRICAUDA. — *Storer*.

Plate II. Fig. 2.

SPECIFIC CHARACTERS. Body dusky above; sides and belly red; appendix to the opercle very long; black, bordered above and below with pale greenish-blue. D. 10 – 11. P. 12. V. 1 – 5. A. 3 – 10. C. 17.

SYNONYMES. *Pomotis rubricauda*, *Storer*, Bost. Jour. Nat. Hist., vol. iv. p. 177.

Pomotis appendix, *Storer*, Synops., p. 42.

Red-bellied Perch, *Vulgo*.

DESCRIPTION. This fish is of an ovoidal form, but more elongated and less arched than *Pomotis vulgaris*. The head is large, broad, and rather prominent

between the eyes, with the snout full and nearly semicircular. The eye is moderate in size, and is placed about one diameter of its orbit from the snout, and two diameters and one quarter from the tip of the opercle, with its lower margin above the median plane of the head. The nostrils are on a line within the orbit; the posterior is the larger; the anterior is tubular, and both are above the median plane of the eye.

The mouth is rather small; the inter-maxillary teeth are numerous, pointed, and thickly set, with an outer row of larger teeth, conical, pointed, and recurved; the lower jaw is armed in like manner; the palatine and vomerine teeth are very minute; the pharyngeal bones are covered with teeth similar to those of the outer row of the lower jaw, with a few smaller ones behind. The pre-opercle is rounded and but slightly serrated at its angle, with its ascending border directed a little backwards; it is smooth, though the cheeks above are covered with scales. The opercle is triangular, with its apex below, and its posterior angle rounded, and sustains a long fleshy appendix. The sub-opercle is an isosceles triangle in shape, long, narrow, rounded below, with its basis before and its apex behind. The inter-opercle is nearly a parallelogram, narrow, and covered with a single row of scales.

The dorsal fin begins on a line with the middle of the appendix of the opercle, and has ten short, rather stout spines, and eleven branched rays considerably longer than the spines. The pectoral is broad, and begins in front of the termination of the bony opercle and ends at the middle of the vent. The ventral is long; it arises at the root of the pectoral and extends beyond the vent; it has one short spine, and five soft rays, of which the anterior ends in a filament. The anal begins nearly with the soft dorsal rays, and terminates with them behind; it has three spines, the anterior very small, and the third very long and strong; there are ten soft rays, much longer than the spines. The caudal is large, broad, slightly lunate, and has seventeen rays.

The lateral line begins at the upper margin of the opercle, and runs near the upper third of the body, concurrently with the dorsal outline to the root of the tail, when it descends to the median plane.

COLOUR. The head is dusky above, and has often a greenish tint ; the opercles and cheeks are red, with blotches or waving lines of pale blue running from the upper lip towards the orbit ; the appendix of the opercle is dark, bordered above and below with pale greenish-blue ; the body above the lateral line is more or less dusky, with cupreous tints ; below the lateral line it is red ; the pectoral fin is transparent, with a pale bluish tint at its posterior extremity ; the anal is of a bluish colour near its tip, and has occasional cupreous spots at its base. The caudal is dusky at its root, and reddish at its tip.

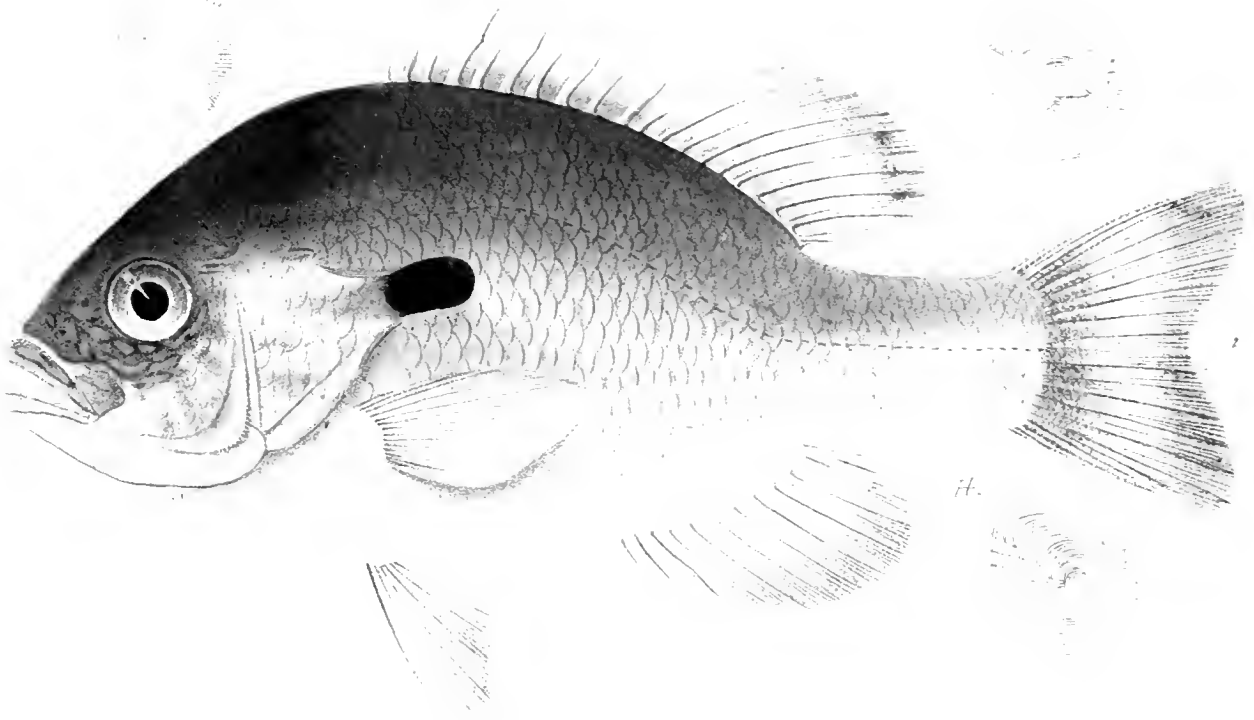
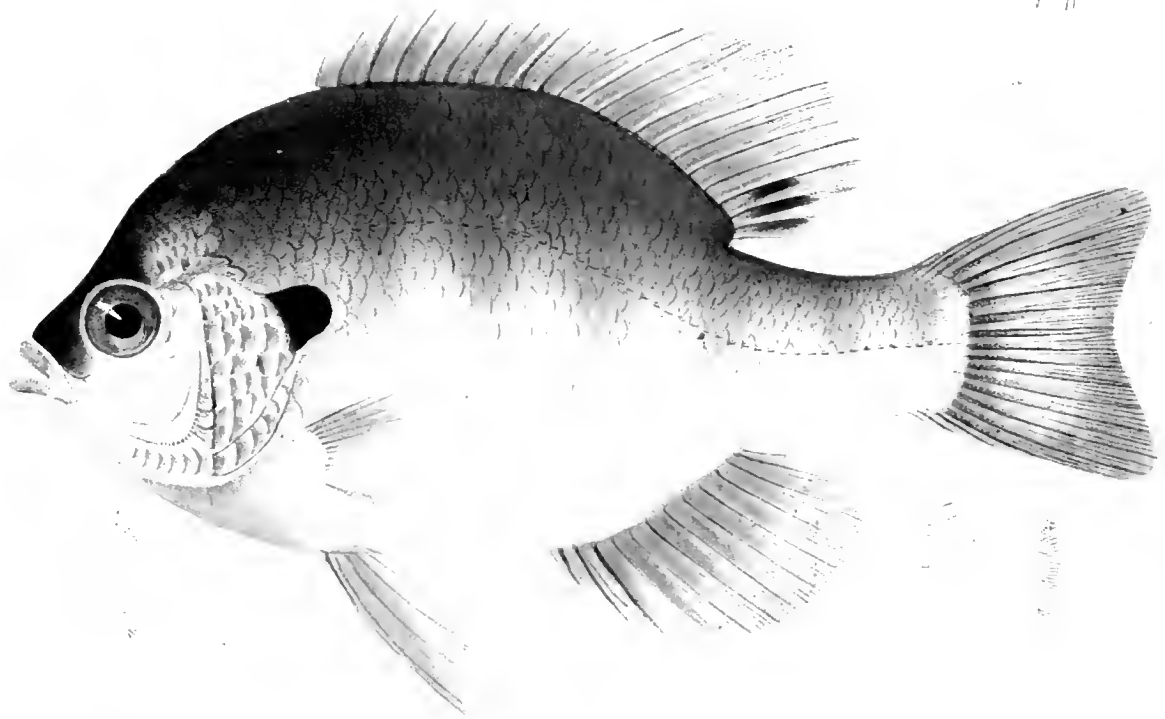
DIMENSIONS. Head one fourth the entire length of the animal ; elevation without the dorsal fin equal to one head and a half ; total length, eleven inches.

SPLANCHNOLOGY. The peritoneum is silvery. The liver is large, and without fissures on its inferior face, though its left portion is longest and extends even behind the stomach. The gall-bladder is in size and shape like a small olive ; its walls are thin, and the bile is very light-coloured. The stomach is large, for, though small at first, it suddenly increases in dimensions, and, as the pyloric portion goes off from its anterior part, it is so bent as to appear heart-shaped when distended ; the pyloric valve is well developed ; the small intestine is at first very large, yet it soon decreases in size and runs to the vent, whence it is reflected to the last cæcal appendage, and then again turns backwards to end in the rectum, which is less capacious and has no valve. There are seven cæcal appendages, increasing in length to the last, which is two inches long. The air-bladder is large, as it extends not only the length of the abdominal cavity, but is prolonged in two broad horns for an inch or more behind the vent ; it is rather heart-shaped in front, and has thin and silvery walls. The kidney is well developed behind, though it is small in front.

HABITS. This fish lives with the *Pomotis vulgaris*, and feeds on the same prey, but is always found in deep waters.

GEOGRAPHICAL DISTRIBUTION. From Massachusetts to Georgia.

GENERAL REMARKS. The specific name "*rubricauda*," first imposed on this fish by Dr. Storer, has here been retained, because it does not appear to me certain that this animal is identical with the *Pomotis appendix* ; for that is a much smaller fish, with the body more arched, — its colour is dusky above and white below, — its auricular appendix is always black, and has never a border of bluish-green, — and it has only as yet been found in New York.



POMOTIS INCISOR. — *Cuv. et Val.**Plate II. Fig. 1.*

SPECIFIC CHARACTERS. Body very convex, deep blue above, lighter and bronzed below, with two cupreous spots above and behind the eyes. D. 10 – 12. P. 13. V. 1 – 5. A. 3 – 11. C. 17.

SYNONYMES. Pomotis incisor, *Cuv. et Val.*, Hist. Nat. Poiss., tom. vii. p. 267.

Pomotis incisor, *DeKay*, Zoöl. N. Y., part iii. p. 33.

Pomotis incisor, *Storer*, Synops., p. 41.

Bream, Blue Bream, or Copper-nose Bream, *Vulgo.*

DESCRIPTION. This fish without the head and tail is so much arched, both above and below, as to be nearly sub-round, like the *Chætodons*. The head is short, not much elevated, smooth above, and the snout broad and full. The eye is very large, with its inferior border above the median plane of the head, and is less than its diameter from the snout. The nostrils are midway between the eye and snout, but on a line within the orbit; the posterior is ovoid, the anterior round.

The mouth is of moderate size; the teeth of the inter-maxillary are similar to those of the *Pomotis vulgaris*, though the outer row of larger teeth are not so long, and in the old animal they are frequently blunt at their extremities; the lower jaw has an external row of similar teeth, and within these are numerous others, slender, pointed, and recurved. The superior pharyngeals are small, and covered with conical teeth, more or less pointed, and of various sizes; the posterior are minute, closely set, villiform, and the inferior pharyngeal has minute teeth on its outer half, and moderately strong, conical teeth, more or less pointed, along its inner half. The pre-opercle is rounded at its angle. The opercle is sub-triangular, with its posterior angle rounded, from which hangs a long fleshy appendix. The sub-opercle is long, broadest below; the inter-opercle is broad.

The dorsal fin begins behind the tip of the bony opercle, and extends to the root of the tail; its anterior portion has ten spines, compressed, and ensiform; the posterior portion is the more elevated, and has twelve branched rays. The

pectoral is broad; it begins near the angle of the opercle, extends to the root of the anal fin, and has thirteen rays. The ventral is broad; it begins about the anterior fourth of the pectoral fin and reaches beyond the origin of the anal, and has one spine and five branched rays, the anterior of which is prolonged in a filament. The anal is broad, elevated, ends behind the dorsal, and has three spines, the anterior small, the others large and long, with eleven branched rays. The caudal is broad, slightly forked, and has seventeen rays.

The lateral line begins with the appendix of the opercle, and runs parallel with the dorsal outline to the end of the root of the dorsal fin, when it descends to the median plane; its scale is unguiform, with the duct in the middle.

COLOUR. See *Specific Characters*. Yet it varies much in different waters.

DIMENSIONS. The head is one fourth the length of the animal; elevation, one head and a half; entire length, seven and a half inches.

SPLANCHNOLOGY. The peritoneum is silvery. The liver is large and consists of two lobes, though the separation is slightly marked in front; the left lobe is much the larger; the right is short, and gives off a small lobule at its right and anterior extremity. The stomach is large, curved, with thick walls; there are eight cæcal appendages, large and long; the small intestine is very capacious, and makes several convolutions before it ends in the rectum, which is smaller, though its walls are thicker; it has well-developed longitudinal folds, but no rectal valve. The air-bladder is very large, and extends throughout the abdomen, and subdivides behind into two horns, which are continued some distance behind the vent; at its posterior and superior part is a well-marked vascular ganglion. The kidney is bulky and well developed behind, and the urinary bladder is large.

GEOGRAPHICAL DISTRIBUTION. This fish is common in the rivers and ponds of fresh water in the lower part of South Carolina, and extends even to Louisiana.

HABITS. They live in company with the *Pomotis vulgaris*, feed on the same food, and are taken with the same bait, though they do not seem to have the curious habit of the former, of constructing a nest for their spawn.

GENERAL REMARKS. This animal bears some resemblance in form to the *Pomotis appendix*; but that is a smaller animal, of a different colour, wanting the black spot in the dorsal fin, and inhabiting a different geographical region.

GENUS CENTRARCHUS. — *Cuv. et Val.*

CHARACTERS. Body broad, oval, greatly compressed; dorsal fin single, very large, elevated, with no depression between its spinous and soft portions; spinous portion the larger; anal large, extending between the ventrals, in form and size like the dorsal; mouth small, inter-maxillary, inferior maxillary, vomer, palate, pharyngeal bones, and tongue, with minute teeth.

REMARKS. This genus was established to include several Percidæ, having certain forms in common; as, Body oval, compressed; dorsal fin single; teeth on the tongue, &c.; but several of these fishes differ from each other in so many respects that it became necessary to refer them to other genera, and even to restrict the genus itself. This has been done by Professor Agassiz with great clearness and precision; and furthermore he has distributed many of these fish among genera long since established by Rafinesque.

CENTRARCHIUS IRIDEUS. — *Lacépède.*

Plate III. Fig. 1.

SPECIFIC CHARACTERS. Body sub-elliptical, dusky-green above, sides white, with bluish-green spots; dorsal fin with a dusky spot, bordered with orange near the posterior extremity of its soft portion. P. 11. V. 1-5. D. 11-14. A. 8-15. C. 17.

SYNONYMES. Le Labre iris, *Lacép.*, Hist. Nat. Poiss., tom. iv. p. 716, pl. 5, fig. 3.
Centrarchus irideus, *Cuv. et Val.*, Hist. Nat. Poiss., tom. iii. p. 89; *id.* vii. 458.
Centrarchus irideus, *DeKay*, Zoöl. N. Y., part iii. p. 31.
Centrarchus irideus, *Storer*, Synops., p. 39.

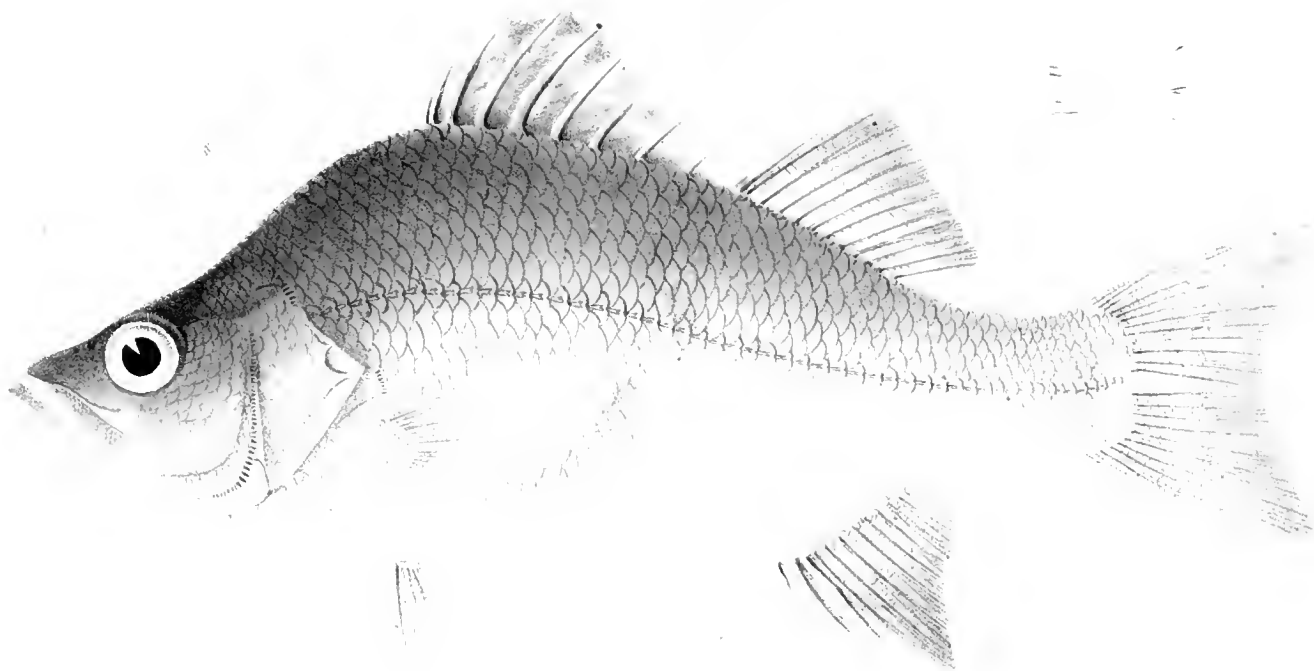
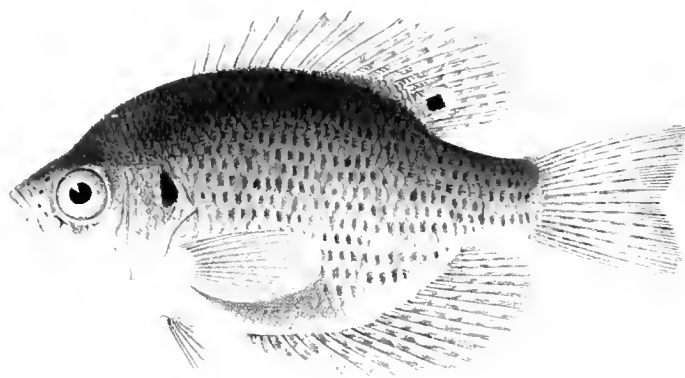
DESCRIPTION. The form of this fish is nearly elliptical, its dorsal and ventral

outlines being arched alike, and is much compressed. The head is small, though broad above, and the facial outline slightly incurved, with the snout broad. The eye is very large, prominent, and is placed half the diameter of its orbit from the snout, and rather more than one diameter from the tip of the opercle, with its inferior margin at the middle plane of the head. The nostrils are very near the eye, and are on a line within the orbit.

The mouth is very small, and the lower jaw is longer than the upper, though its teeth are received within it when the mouth is closed. The group of intermaxillary and inferior maxillary teeth are small, closely set, pointed, recurved, with an outer row of slightly larger teeth; the pharyngeal bones are closely studded with minute, short, and pointed teeth; the vomerine teeth, as well as the palatine, are equally minute; and the tongue has a small patch of similar teeth. The preopercle is but slightly rounded at its angle, where it is naked, and minutely serrated. The opercle is rather broad, and sustains a short fleshy appendix. The subopercle is long, narrow, and has a single row of large scales; the head above, from the middle of the orbits, is smooth, but the cheeks are covered with scales.

The dorsal fin arises behind the root of the pectoral, is very large, and elevated, especially in its soft portion; it has twelve spines and fourteen branched rays. The pectoral begins at the opercle, ends at the root of the sixth anal spine, and has twelve rays. The ventral fin begins rather in front of the dorsal, and terminates with the root of the fifth anal spine; it has one spine and five soft rays, the anterior of which is prolonged. The anal is as large as the dorsal fin, and is of the same form; it has eight spines and fifteen branched rays. The caudal is large, broad, nearly entire, and has seventeen rays. The scales are large. The lateral line corresponds to the curve of the back, and is placed about the superior fourth of the body.

COLOUR. The cheeks and sides of the head are of greenish-yellow; the head above, and the back, are dusky, with a greenish tint; the sides are white, with bluish-green spots, arranged in interrupted lines; the pectoral and ventral fins are transparent; the dorsal and anal are semi-transparent, and marked with numerous



spots of yellowish-brown ; the former has a remarkable dark spot bordered with orange near the posterior extremity, which grows more indistinct with age.

DIMENSIONS. The length from the opercle to the tip of the tail is equal to three heads ; the greatest elevation, with the dorsal fin, to two heads ; total length, six inches.

HABITS. This fish is found in rather deep water of ponds and rivers, in company with the *Pomotis vulgaris*, and is taken with the same bait.

GEOGRAPHICAL DISTRIBUTION. For the present, South Carolina only can be given.

GENERAL REMARKS. This animal, which must be regarded as the type of the genus, was discovered by Bosc in the neighbourhood of Charleston, and he sent it, with a drawing, to Lacépède, by whom it was first described.

GENUS LABRAX. — *Cuvier*.

CHARACTERS. Opercular bones covered with scales ; the opercle terminates behind in two spines ; sub-opercle and inter-opercle not serrated ; palatine, vomerine, and maxillary teeth ; tongue armed with minute teeth ; branchial rays seven.

LABRAX LINEATUS. — *Bloch*.

Plate IV. Fig. 2. }

SPECIFIC CHARACTERS. Body above dusky, sides and belly silvery-white ; sides marked with seven or eight longitudinal lines of bluish-black colour. D. 9 - 2 - 12. P. 15. V. 1 - 5. A. 3 - 11. C. 17.

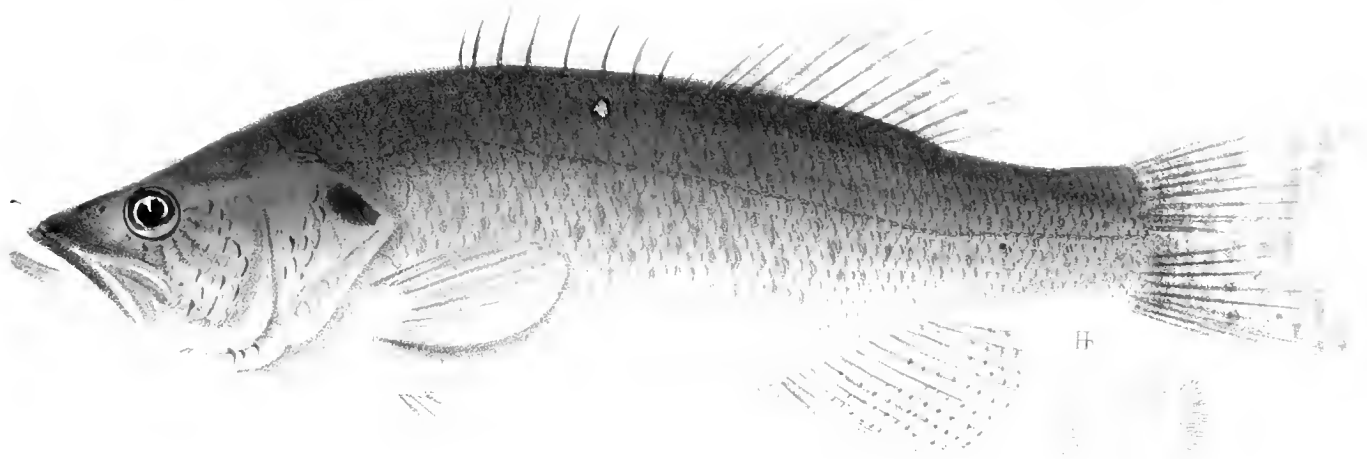
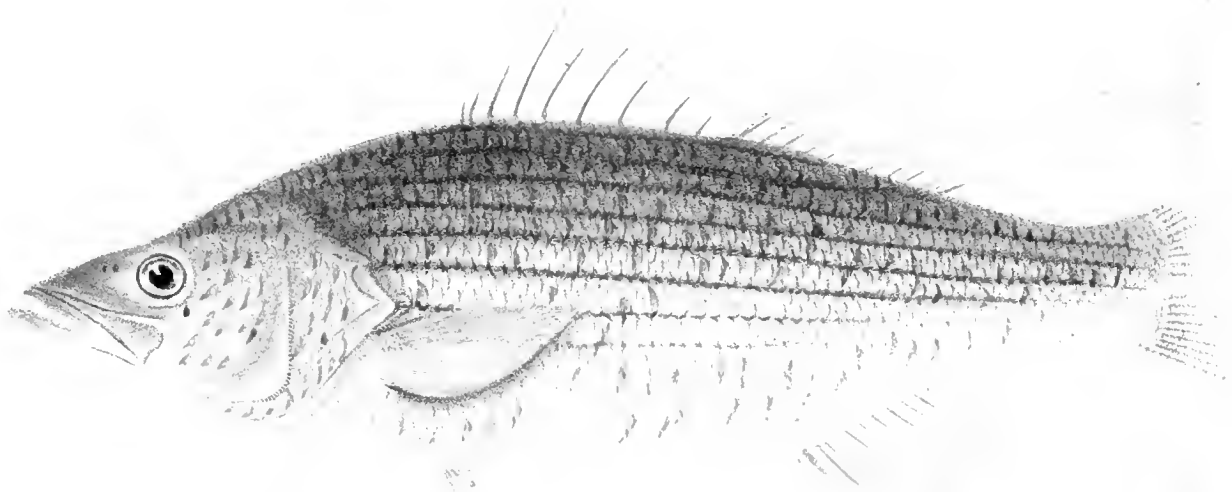
SYNONYMES. *Sciæna lineata*, *Bloch*, *Ichth.*, pars ix. p. 53, pl. 304.

Perca ———, *Schoepff*, *Schrift. der Gesells. Nat. Freund.*, b. viii. p. 160.

- Perca saxatilis*, *Schneid.*, ed. *Bloch*, Ichth., p. 89; *id.* *P. septentrionalis*, p. 90, pl. 20.
Centropome rayé, *Lacép.*, Hist. Nat. Poiss., tom. iv. p. 225.
Perca Mitchilli, *Mitch.*, Trans. Lit. and Phil. Soc. N. Y., vol. i. p. 413, pl. 3, fig. 4.
 Rock-fish, *Mease*, Trans. Lit. and Phil. Soc. N. Y., vol. i. p. 502.
Labrax lineatus, *Cur. et Val.*, Hist. Nat. Poiss., tom. ii. p. 79.
Labrax lineatus, *Rich.*, Faun. Boreal. Am., iii. p. 10.
Labrax lineatus, *Storer*, Report, &c., p. 7.
Labrax lineatus, *Ayres*, Bost. Jour. Nat. Hist., vol. iv. p. 257.
Labrax lineatus, *DeKay*, Zoöl. N. Y., part iv. p. 7, pl. 1, fig. 3.
Labrax lineatus, *Storer*, Synops., &c., p. 21.
 Rock-fish, *Vulgo*.

DESCRIPTION. The body is elongated, sub-cylindrical, moderately compressed, with the dorsal outline regularly, though gently, arched; it is thin along the back, and almost carinated in front of the dorsal fin; the ventral line is less arched than the dorsal, and the fish is thicker at the belly than along the back, but its thickest part is near the lateral line. The head is large, long, thick, and very broad between the eyes, where it is so depressed as to make the facial outline slightly concave. The snout is very full and rounded. The nostrils are closely approximated, and much nearer to the orbit than to the snout; they are about the median plane of the eye, and on a line within the orbit; the posterior is larger and sub-oval; the anterior is round. The eye is very large, rather longest horizontally, and is one diameter and one eighth of the orbit from the snout, and three diameters and a quarter from the angle of the opercle, with its inferior margin about the median plane of the head.

The mouth is large, though the upper jaw extends only to the middle of the orbit; the lips are tolerably thick and fleshy; the lower jaw is longer than the upper, and both are armed with numerous small, villiform, pointed, slightly recurved and card-like or closely set teeth; they are nearly of the same size in both jaws, but those of the outer row in the inter-maxillary bone are rather largest. The palate-bones have each a long, slender patch of minute teeth, and the vomer an angular group in front. There are two bands of minute teeth, at the root of the tongue, separated slightly from each other in the mesial line; the sides of the



tongue are also armed with small teeth. The pharyngeal bones are thickly covered with teeth, similar in size and form to those of the upper jaw.

The pre-opercle is rounded at its angle, and is serrated throughout its free border, though minutely so above. The opercle is sub-triangular, with its apex behind, crescentic, and ending in two spines. The sub-opercle is very long, narrow, and covered with a single row of large scales; the inter-opercle is narrow, and rounded below. The whole head above, as well as at the sides and posterior extremity of the superior maxillary bones, is covered with scales, except in front of the eyes. The gill-openings are large; there are seven branchial rays. The supra-scapular and humeral bones are slightly serrated.

There are two dorsal fins; the anterior begins rather behind the root of the ventral, and has nine spines, of which the third is longest, and all are partially received in a groove when the fin is closed. The posterior dorsal is more elevated than the anterior; it is slightly crescentic at its superior border, and has two spines and twelve soft rays, covered with a few scales near its base. The pectoral arises very near the gill-openings, and extends to the root of the sixth dorsal spine; it is broad, very long, and has fifteen rays. The ventral begins at the anterior fourth of the pectoral, extends one fourth of its length beyond it, and has one spine and five branched rays. The anal fin commences with the middle of the soft dorsal, and terminates beyond it; its inferior margin is sub-crescentic, and it has three spines, the anterior very short, and eleven soft rays. The caudal is large, crescentic, and has seventeen rays, the connecting membrane of which is covered, for some distance, with scales.

The scales are nearly semicircular, with the diameter in front, round and finely ciliated behind. The lateral line begins at the supra-scapular, and runs straight to the tail; its scale is sub-pentagonal, round and ciliated behind, with the excretory duct nearly in its middle.

COLOUR. The body above is a dusky silver-grey, the sides and belly are shining silvery-white, and marked with seven or eight longitudinal dark bands, one of which includes the lateral line.

DIMENSIONS. The entire length, from the opercle to the tip of the tail, is equal to three heads; the greatest elevation without the dorsal fin, to one head; total length, twenty-one inches. Rock-fish are sometimes taken of much greater size.

SPLANCHNOLOGY. The liver is very large, thick, and without divisions into lobes; it extends much the farthest back on the left side, and is very full in front; it is of a very pale colour; the gall-bladder is of great size, and conical in form, reaching more than half its length behind the right lobe. The stomach is long, cylindrical, not very broad, and has enormously thick walls; its pyloric branch begins near the anterior fifth, is very short, but stout, and has a well-marked contraction. The small intestine runs at first nearly to the vent; it is then reflected to the pylorus, whence it returns to end in the rectum, which has thick walls; the rectal valve is remarkably full, projecting far into the intestine; its surface next the small intestine has large plaits radiating to the centre; its rectal surface is smooth; the spleen is very large, and of darkest purple colour. The air-bladder is of great size, reaching the whole length of the abdomen, is rather pointed behind, broad in front, with four or five large sacs on each side.

HABITS. The Rock-fish inhabits not only our Atlantic shores, but it also enters those rivers that open into the sea, and is often found many miles from the coast; yet, on the whole, it must be regarded as a salt-water fish, at least in the northern parts of our country. Dr. Mitchill says, they only ascend fresh-water streams in the spring to breed, or for shelter during the winter; and Dr. Mease observes, that, after heavy rains, or the sudden melting of snow in great quantities, these fish are forced from their abodes back again into the salt water, but when the *freshet* subsides they invariably reascend. Many of the larger kind never run up streams of fresh water, but live along the shore, and only enter creeks and inlets with the flood tide, and chiefly at night, in search of food, and return with the ebb. In Carolina the habits of this fish are somewhat different, as it is seldom taken in salt water, and is constantly seen in the rivers of fresh water, and at a distance from the ocean. It feeds on various small fish, as well as on crustaceous animals. It is esteemed one of our most savoury fishes.

GEOGRAPHICAL DISTRIBUTION. The *Labrax lineatus* is found along the coast from Maine to Georgia.

GENERAL REMARKS. The first account of this fish may be seen in the Ichthy-

ology of Bloch, who placed it in his genus *Sciæna* with the specific name *lineata*, which is still retained. Bloch, however, does not seem to have been acquainted with the native country of the animal he described; on the contrary, he supposed it an inhabitant of the Mediterranean, where it is never seen. — Schoepff, in his Memoir on the Fishes of New York, gives an accurate description of this animal, and says it is called *Rock-fish*, or *Striked Bass* (Streaked Bass); and from this description Schneider, in his edition of Bloch, established his *Perca saxatilis*, which specific name cannot be retained, as that of Bloch has the right of priority. — Dr. Mitchill, many years after, gave another description of the *Bass* or *Rock-fish*, as the *Perca Mitchilli*, being probably unaware that it had been previously described more than once, and under different names. — Cuvier and Valenciennes have given the best description of our fish up to the present time, arranging it in the genus *Labrax*, and retaining the specific name first applied to it by Bloch.

LABRAX AMERICANUS. — *Gmelin*.

Plate III. Fig. 2.

SPECIFIC CHARACTERS. Body oval, much compressed, dusky above, silvery at the sides and belly; neither spots nor stripes. D. 9 – 1 – 12. P. 14. V. 1 – 5. A. 3 – 9. C. 17.

- SYNONYMES. *Perca* ———, *Schoepff*, Schrift. der Gesells. Nat. Freund., b. viii. p. 159.
Perca Americana, *Gmel.*, Ed. Syst. Nat., tom. i. pars iii. p. 1308.
Perca Americana, *Lacép.*, Hist. Nat. Poiss., tom. iv. p. 252.
Morone rufa, *Mitch.*, Report in part, &c., p. 18.
Bodianus rufus, *Mitch.*, Trans. Lit. and Phil. Soc. N. Y., vol. i. p. 420.
Labrax mucronatus, *Cuv. et Val.*, Hist. Nat. Poiss., tom. ii. p. 86, pl. 12.
Labrax mucronatus, *Storer*, Report, &c., p. 8.
Labrax rufus, *DeKay*, Zoöl. N. Y., part iv. p. 9, pl. 3, fig. 7.
Labrax rufus, *Storer*, Synops., p. 22.
 White Perch, *Vulgo*.

DESCRIPTION. The form of this fish, without the caudal fin, is nearly oval ; it is compressed, arched and thin along the back, less arched and slightly thicker at the belly. The head is rather long, but not much elevated ; the facial outline is nearly straight, and the head is flat above, very narrow between the eyes, though the snout is tolerably full and round. The eye is very large ; it is one diameter from the snout, rather more than two diameters from the spine of the opercle, with its inferior margin rather below the median plane of the head. The nostrils are closely approximated ; the posterior and larger is sub-round and very near the orbit ; the anterior is round ; and both are on a line without the orbit and near the middle plane of the eye.

The mouth is of moderate size, the posterior extremity of the upper jawbone extending but slightly beyond the anterior margin of the orbit. The lower jaw is shorter than the upper, and both are armed with a group of numerous small, pointed, villiform teeth, closely crowded together, and nearly of the same size. The palate-bones have each a long, narrow patch, and the vomer an angular group, in front, of still more minute teeth than those of the inter-maxillary bones. The tongue has a band of minute teeth at its edges, and many more are scattered about its tip ; the pharyngeals are covered with teeth, similar in size and form to those of the jaws.

The pre-opercle is rounded at its angle, and its whole free margin is serrated. the largest serratures being at the angle. The opercle is longest vertically, and terminates behind in a crescentic margin with two spines, of which the inferior is the longer ; between these spines the skin is extended. The sub-opercle is irregularly quadrilateral, elongated, and narrow. The inter-opercle is rather broad, and is rounded below. The whole head above and on the sides is covered with scales to the anterior margin of the orbit ; the scales on the opercle are very large, those on the posterior extremity of the superior maxillary bone are minute ; the sub-opercle and inter-opercle have each a single row of scales. The gill-openings are large ; there are seven branchial rays. The supra-scapular and humeral bones are slightly serrated.

The anterior dorsal begins at the most prominent part of the back, and on a line behind the origin of the ventral fin; it has nine spines, partially received in a groove when the fin is closed. The anterior spine is very short, and the fourth is longest and very stout; the posterior dorsal is rather more elevated than the anterior; it has one spine and twelve soft rays, protected at their root by a wall of scales; smaller scales also ascend for some distance on the connecting membrane of the rays. The pectoral begins near the spine of the opercle, and extends beyond the root of the eighth dorsal spine, and has fourteen rays. The ventral arises behind the root of the pectoral, extends slightly beyond it, and has one spine and five soft rays, the anterior of which is slightly prolonged into a filament. The anal fin begins about the middle of the soft dorsal, and extends beyond it, and is very slightly crescentic; it has three spines, the anterior minute and the second long and very stout, and nine soft rays, with scales like the posterior dorsal. The caudal is large, slightly crescentic, and has seventeen rays; its membrane is covered with scales for some distance.

The scales are nearly quadrilateral, straight before, rounded and ciliated behind, and marked with twelve radiating lines. The lateral line is very slightly arched at first, but is soon nearly concurrent with the dorsal outline to the end of the second dorsal fin, and is placed about the upper third of the body; its scale is four-sided, sub-cordate and ciliated behind, with its excretory duct near the middle.

COLOUR. The back and sides above are pale silver-grey; the sides below and belly are silver-white, and without spots or marks.

DIMENSIONS. The entire length, from the opercle to the tip of the tail, is equal to two heads and three quarters; the greatest elevation without the dorsal fin is one head and a quarter; total length, ten inches.

SPLANCHNOLOGY. The liver is short, but thick, and appears as one mass on its lower surface, though it is separated into three lobes behind, of which the left is longest and the right is very short. The stomach extends about half the length of the abdomen, and is pointed behind; it has thin walls, and the pyloric branch begins near its middle, is short, and has much thicker walls. The

intestine runs nearly to the vent, and is then reflected to the base of the pylorus, whence it returns to end in the rectum ; it has an indistinct valve, and its walls are thin ; there are five rather long and very slender cæcal appendages. The air-bladder is large, and extends the whole length of the abdomen ; it is sub-oval in shape, and larger before than behind.

HABITS. The White Perch inhabits various bays and inlets of salt water along our coast, and ascends for some distance those rivers that open into the sea ; although this is a marine species, it has been transplanted to ponds and lakes of fresh water in the Northern States, where it thrives very well.

GEOGRAPHICAL DISTRIBUTION. The range of the *Labrax Americanus* is very great, extending from Massachusetts to South Carolina, which must for the present be considered its extreme southern limit ; and even here it has only been observed in the neighbourhood of Georgetown, whence I have received specimens from Dr. Sparkman and from Dr. Cheves.

GENERAL REMARKS. This animal was first described by Schoepff, under the simple name of *Perca*, *Perch*, or *River Perch of New York* ; which, he says, nearly approaches in size the *European Perch* ; but it wants the six black bars and the black spot at the extremity of the dorsal fin. Gmelin's description of our animal is taken entirely from Schoepff, but he first applied to it the specific name *Americana*, which must be retained. — Dr. Mitchill, long afterwards, described it at first as the *Morone rufa*, and subsequently as the *Bodianus rufus*. — Cuvier and Valenciennes arranged it in the genus *Labrax*, and applied to it the specific name *mucronatus*, supposing it to be identical with the *Perca mucronata* of Rafinesque ; but neither this specific name, nor that of Dr. Mitchill, can be retained, as that of Gmelin, though badly chosen, has the right of priority.

GENUS GRYSTES. — *Cuvier*.

CHARACTERS. Dorsal fin single ; inter-maxillary, maxillary, vomerine, and palatine teeth small, and thickly set, or card-like ; pre-opercle not serrated ; branchial rays six.

GRYSTES SALMOIDES. — *Lacépède*.

Plate IV. Fig. 2.

SPECIFIC CHARACTERS. Head and body dusky above, often with a greenish or bronzed tint ; lower jaw and belly white ; opercle with a bluish-green spot at its angle. D. 9–14. P. 14. V. 1–5. A. 3–12. C. 19.

SYNONYMES. *Labrus salmoides*, *Lacép.*, Hist. Nat. Poiss., tom. iv. p. 716, pl. 5, fig. 2.
Grystes salmoides, *Cur. et Val.*, Hist. Nat. Poiss., tom. iii. p. 54, pl. 45.
Grystes salmoides, *DeKay*, Zoöl. N. Y., part iv. p. 26, pl. 69, fig. 223.
Grystes salmoides, *Storer*, Synops., p. 36.
 Trout, *Vulgo*.

DESCRIPTION. This fish is of an elongated, oval form, arched, thick and rounded along the back ; thinner and nearly straight at the belly. The head is very large and thick, especially between the eyes, and the snout is full and rounded ; the facial outline is nearly straight, though the prominence of the inter-maxillary bone gives it an incurved appearance. The eye is very large ; it is placed one diameter and a quarter of the orbit from the snout, and two and a quarter diameters from the posterior extremity of the opercle, with its lower margin slightly above the median plane of the head. The nostrils are round ; the anterior and smaller is rather nearer to the eye than to the snout, and both are on a line within the orbit.

The mouth is very large, the posterior extremity of the upper jaw extending behind the orbit ; the lower jaw is the longer, and so projects as to make a part of

the superior facial line when the mouth is shut. Both jaws are armed with numerous small, conical, pointed, recurved, card-like teeth; they are all nearly of the same size, except some in the upper jaw, which are directed inwards and backwards. The vomer has in front a large arrow-headed group of minute villiform teeth; and the palate bones have, on each side, a long and rather broad patch of similar teeth. The pharyngeal teeth resemble those of the jaws in size and form. The tongue is large and thick behind, thin, narrow, and rounded in front, smooth, and tolerably free.

The pre-opercle is nearly semicircular at its angle, which is smooth, or not serrated, but the ascending border is slightly emarginate above the angle. The opercle is sub-triangular, with its base before and its apex behind, and emarginate. The sub-opercle is quadrilateral, and extends as far back as the opercle. The inter-opercle is rounded below, and ascends for some distance between the pre-opercle and the opercle. The head is covered with scales above, and at the sides as far as the posterior margin of the orbit; but the superior maxillary bone is naked. The gill-openings are very large; there are six branchial rays.

The dorsal fin is very large and long; it begins rather behind the base of the pectoral, and is single, though deeply emarginate; its anterior portion has nine spines, partially received in a groove; the posterior or soft portion of the dorsal fin is much more elevated, and has fourteen articulated rays. The pectoral is broad, but short, and rounded behind; it arises rather before the termination of the opercle, and has fourteen rays. The ventral begins nearly with the pectoral fin, and is shorter; it has one spine and five soft rays, the internal of which is bound to the belly for half its length. The anal arises nearly in a line vertical with the root of the third dorsal soft ray, and has three spines and twelve branched rays. The caudal is large, broad, slightly crescentic, and has nineteen rays.

The scales are nearly semicircular in shape, with the diameter in front, straight, and marked with twelve radiating lines. The lateral line is concurrent with the back, and runs along the superior fourth of the body; its scale is narrower behind than the others, and its excretory duct is placed obliquely.

COLOUR. The head is dusky above, and silvery though slightly clouded at the sides, with a bluish-green blotch at the opercle; the body is also dusky above, or of a bronzed colour with a greenish tint; the belly is silvery, and along the flanks runs a dusky band, more or less evident, according to the age of the animal; it is remarkable in the young. The dorsal fin is transparent, with only here and there dusky shades; the membrane of the pectoral is transparent, but the rays have a yellowish tint; the ventral is yellowish, and the anal is slightly tinted of the same colour; the caudal is dusky, with a very obscure yellowish shade.

DIMENSIONS. The entire length, from the opercle to the tip of the tail, is equal to two heads and a half; the greatest elevation is seven eighths of a head; total length, fourteen inches; specimens have been observed nearly two feet in length.

SPLANCHNOLOGY. The peritoneum is silvery. The liver is large, and of a very pale colour; it consists of a single rhomboidal mass, as there are no marks of lobes; it is placed mostly in the left side, and projects but slightly into the right. The gall-bladder is large, round, and is in a great measure uncovered by the right margin of the liver. The œsophagus is large and broad. The stomach is large, and has thick, firm, muscular walls, with deep folds of its mucous membrane within; the pyloric portion is short, thick, stout, and departs at a right angle from its posterior third. The intestine runs to the vent, whence it is reflected to the pylorus, and then it turns backwards to end in the rectum; its walls are remarkably thick and firm, and its mucous membrane is beautifully reticulated, and presents numerous small areolæ for two thirds of its length, and beyond this longitudinal folds begin, which are continued into the rectum. There are eleven primitive cœcal appendages, which soon divide into two or three others, so that as many as twenty-eight may at times be counted. The spleen is rather small, very pale, and is situated so far back that its anterior extremity hardly reaches the stomach. The air-bladder is large, and extends throughout the abdominal cavity; it is full in front, but is partially subdivided into two small pouches behind; within, it is bright yellow at its superior and posterior part. The ovaries are sub-oval, rather broad, and unite in substance behind, before they open.

HABITS. The *Grystes salmoides* has somewhat the habits of the common Trout (*Salmo fontinalis*); it lives in ponds or streams of running water, and chooses for its abode deep holes, or the shelter of logs, or the roots of trees that may project into the water; here it remains perfectly quiet for hours, while other fish are

roaming about in search of food ; but should any of the smaller fish, on which it feeds, approach its lurking-place, it suddenly darts out, seizes its prey, and again returns to its favorite spot. It is very voracious, and takes the hook freely when baited with small living fish ; it will also rise to the fly, and being a strong and active fish, its capture affords much sport to the angler. The *Grystes salmoides*, or *Trout* of South Carolina, when in season, is esteemed our best fresh-water fish for the table.

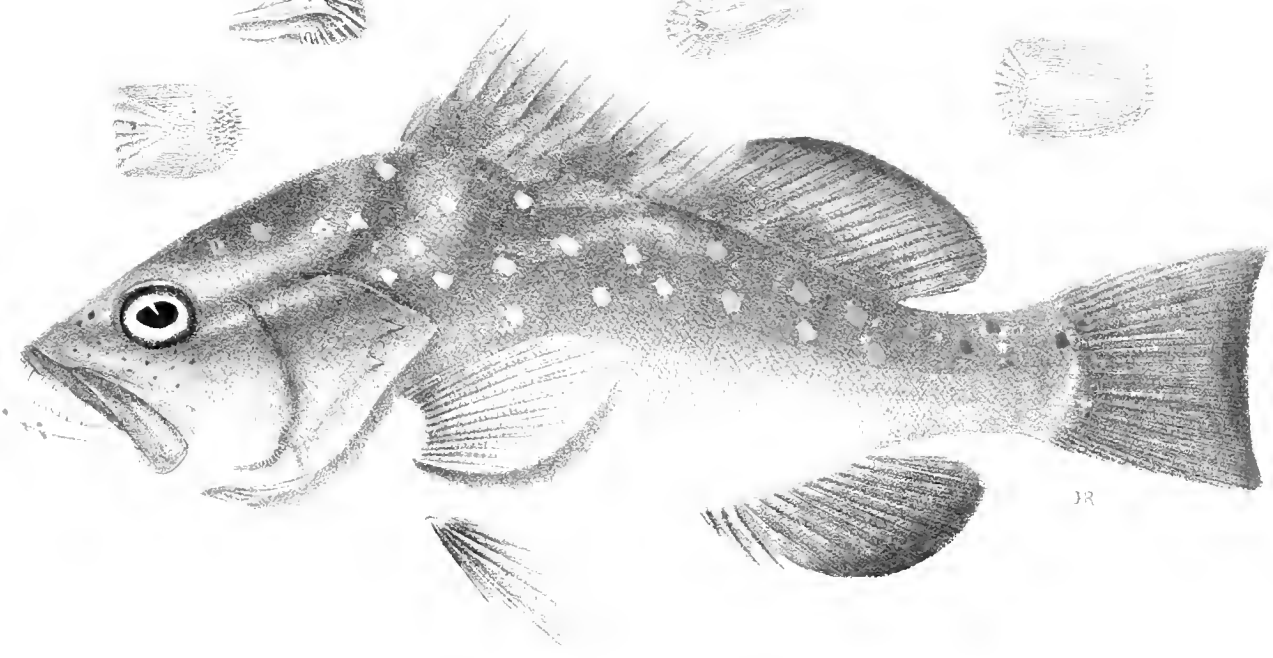
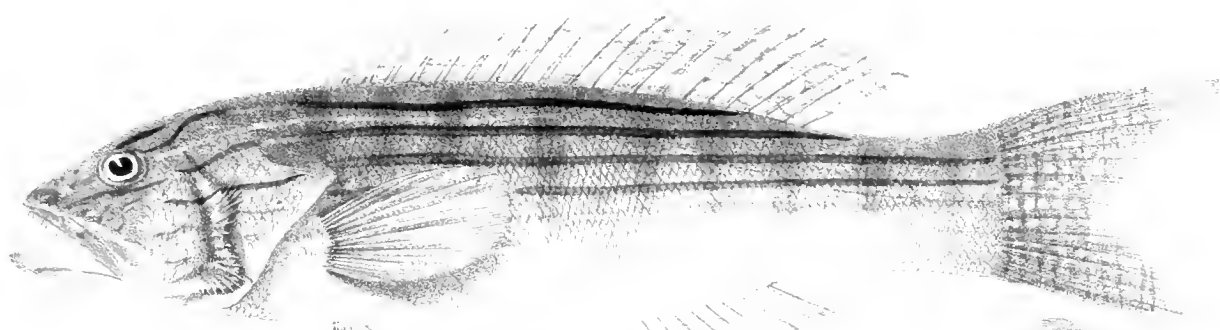
GEOGRAPHICAL DISTRIBUTION. The *Grystes salmoides* is a Southern fish, and is abundant in the waters of Florida, Georgia, and the Carolinas, but has never, so far as I know, been found north of Virginia. Cuvier and Valenciennes supposed this animal to have had a much wider range than is here given, because they received specimens of it from New York, through Milbert ; but he must have procured them from more southern localities. The Trout has, however, its representatives both in the North and West, with which it is closely allied ; as *Grystes nigricans* (*Huro nigricans*) of Cuvier and Valenciennes, and *Grystes fasciatus* (*Cychla fasciata*) of Lesueur, both of which have been referred by Agassiz to the genus *Grystes*.* Cuvier also speaks of having received this animal, through Lesueur, from the Wabash River, in Indiana ; but it was probably the *Grystes fasciatus*, as the Trout is not an inhabitant of those waters.

GENERAL REMARKS. The *Trout* was first described by Lacépède as the *Labrus salmoides*, and from a drawing and specimens sent him by Bosc, from Carolina, under the name of *Perca trutta*.

GENUS SERRANUS. — Cuvier.

CHARACTERS. Canine or long and pointed teeth distributed among the smaller teeth of the jaws ; pre-opercle denticulated ; opercle with one or more spines ; dorsal fin single ; branchial rays seven.

* Lake Superior, &c., p. 295.



REMARKS. This genus embraces a great number of species; more than one hundred have been already described, and arranged in sections, according to the scales on the head; — those with the jaws naked, or uncovered with scales (*Serranus scriba*); — those in which both the upper and the lower jaws are strongly scaled (*Serranus anthias*); — and those in which the lower jaw alone has minute scales (*Serranus gigas*).

SERRANUS ERYTHROGASTER. — *DeKay*.

Plate V. fig. 2.

SPECIFIC CHARACTERS. Head and body above reddish or olive-brown, with large, pale ash-coloured blotches; lower jaw and belly salmon-colour; dorsal, ventral, and caudal fins bordered with blue, more or less distinct. D. 11–17. P. 16. V. 1–5. A. 3–10. C. 18.

SYNONYMES. *Serranus erythrogaster*, *DeKay*, *Zoöl. N. Y.*, part iv. p. 21, pl. 19, fig. 52.

Serranus erythrogaster, *Storer*, *Synops.*, p. 30.

Grouper, *Vulgo*.

DESCRIPTION. The form of this fish, without the caudal fin, is nearly sub-oval, more arched and thinner at the back than at the belly. The head is large; the facial outline is a gentle curve to the snout, which is full and rounded. The eye is large and very near the facial outline, with its inferior margin rather below the superior fourth of the head; it is twice its diameter from the snout, and three and a half diameters from the posterior extremity of the spine of the opercle; the pupil is deep blue, and contracted in front; the iris is reddish-grey, with an inner golden margin, very narrow. The nostrils are nearly of the same size; they are round, and the anterior has a slightly prominent fleshy border, and is nearer the eye than the snout; they are placed below the middle plane of the eye.

The mouth is very large, with lips thick and fleshy; the upper jaw is protractile. The lower jaw is longer than the upper, though its teeth are received within it

when the mouth is shut. Both jaws are armed with numerous card-like teeth, pointed and curved backwards; those near the middle are the largest; there is also a posterior row of longer and very sharp teeth; and in front of these are from two to four canine teeth in both jaws. There is a chevron of card-like teeth on the vomer; each palate-bone is armed with a long group of similar teeth, and each group has an internal series rather longer than the others. The tongue is small thin, rounded in front, and but slightly movable. The superior pharyngeals are studded with numerous card-like teeth; the inferior have similar teeth, but those of the internal row are longest.

The pre-opercle is but slightly rounded at its angle, with its posterior border serrated finely above, and with larger serratures below. The opercle is irregularly pentagonal, with a long, straight margin before, and a concave margin behind, between two flat spines, in which it ends; the upper spine is rounded and the longer, the lower is sharp-pointed; and from them is extended back a triangular fold of skin. The sub-opercle is long, large, sub-pyramidal, with its apex behind and base before. The inter-opercle is sub-triangular, with its apex before and truncated. The whole head is covered with scales, except between and in front of the eye. The gill-openings are very large; there are seven branchial rays.

The dorsal fin is long, large, single, but emarginate; it arises with the ventral, and ends near the caudal; it has eleven stout spines, the first very short, and the third longest; the soft portion has seventeen rays. The pectoral is broad and rounded behind; it begins before the fleshy termination of the opercle, but does not extend quite as far back as the ventral, and has sixteen rays; both the spinous and soft portions are covered with small scales for some distance. The ventral is very large and broad; it arises behind the root of the pectoral, and has one spinous and five soft rays, the internal of which is joined for half its length by skin to the belly. The anal is large and elevated; it begins nearly opposite the root of the third dorsal soft ray, and extends as far back; it has three spines, the anterior very small, and ten branched rays, and is covered with small scales for half its length. The caudal is large, broad, and nearly entire, or but slightly lunated, and has eighteen rays, covered for some distance with minute scales.

The scales are small and regularly unguiform, rounded and ciliated behind, nearly straight, but with a scalloped margin and eight radiating lines in front. The lateral line is concurrent with the back and about the superior fourth of the body; its scale is pyriform, pointed behind; its duct is nearly in the middle, and begins very broad in front.

COLOUR. The roof of the mouth and pharynx are bright salmon-colour, except the pharyngeal bones, which are white; the inner margin of the lower jaw is also salmon-colour, and the tongue has the same tint, except at its tip, which is white; the head and body above are reddish-brown, with irregular blotches of palest ash-colour; the belly is salmon-colour; the soft dorsal, caudal, and anal fins are bordered with blue, more or less marked.

DIMENSIONS. The length, from the spine of the opercle to the tip of the tail, is equal nearly to three heads; the greatest elevation, nearly to one head; total length, three feet.

SPLANCHNOLOGY. The small intestine is rather capacious, and is longer than the fish itself; it runs at first nearly to the vent, where it makes a number of short convolutions, and is then reflected to the pylorus, whence it returns to end in the rectum. The liver is of a dark colour, and small for the size of the fish; it consists of two lobes, united by a short transverse portion; the left lobe is more than twice as long as the right, and more than three times its bulk; both have thin margins, and both terminate pointedly behind. The peritoneum is exceedingly thick, firm, and satin-like, resembling in structure the air-bladder of many fishes. The gall-bladder is but a long tube, extending behind the right lobe of the liver towards the vent; it is only connected to the lobe by its ducts, and empties into the intestine very near the pylorus. The stomach is very large, and extends three fourths of the abdomen, and has exceedingly thick muscular walls. Its pyloric portion begins about its posterior fifth, and is short. The spleen is short, small, and lies above the small intestines. The rectum is more capacious than the small intestine, but has thinner walls, with minute longitudinal folds; the rectal valve is broad and circular. There are twenty-eight long and rather stout cæcal appendages, nearly surrounding the intestine beyond the pylorus. The air-bladder is large, conical, rather flattened, with its apex behind and base before; it has exceedingly thick walls, and on its inferior face is a vascular ganglion, and numerous vessels are seen on its superior. The urinary bladder is very large. In the empty state, the testicles are long, slender, and have their margins lobulated.

HABITS. The *Grouper* is so seldom seen on our coast that nothing can, at this time, be said of its habits; but in confinement, as it is brought to us from Key West, it appears very voracious and bold, taking its food even from the hand, when offered, and always injuring such other species of fish as may be its fellow-captives.

GEOGRAPHICAL DISTRIBUTION. The *Grouper* is very abundant in the Gulf of Mexico; it is exceedingly rare on the Carolina coast, though, according to DeKay, it is sometimes taken as far north as New York.

GENERAL REMARKS. This fish was first made known to naturalists by Dr. DeKay, in his Zoölogy of New York.

GENUS DIPLECTRUM.* — *Holbrook*.

CHARACTERS. Pre-opercle armed with two rounded groups of radiating spines; sub-opercle with a membranous prolongation behind; jaws without scales; maxillary, inter-maxillary, palatine, and vomerine teeth small and villiform; a few larger teeth in the lower maxillary and inter-maxillary bones; body much elongated, sub-compressed; dorsal fin single, and very long; branchial rays seven.

DIPLECTRUM FASCICULARE. — *Cuv. et Val.*

Plate V. Fig. 1.

SPECIFIC CHARACTERS. Pre-opercle with two groups of radiating spines; sides marked with longitudinal lines of ultra-marine blue. D. 10–12. P. 15. V. 1–5. A. 3–7. C. 16.

* *Δίς*, twice, and *πληκτρον*, a spur.

SYNONYMES. *Serranus fascicularis*, *Cuv. et Val.*, Hist. Nat. Poiss., tom. ii. p. 245, pl. 30; *idem*, tom. vi. p. 350.

Serranus fascicularis, *DeKay*, Zoöl. N. Y., part iv. p. 23.

Serranus fascicularis, *Storer*, Synops., p. 28.

Squirrel-fish, *Vulgo*.

DESCRIPTION. The body is elongated, sub-compressed, and slightly arched along the back. The head is large, broad above, though rather contracted between the eyes, but the snout is full and rounded. The eye is very large, longest in the horizontal direction; it is placed one diameter and a quarter from the snout, and three diameters from the posterior margin of the opercle, with its inferior margin above the median plane of the head. The anterior and smaller nostril is midway between the orbit and snout; the posterior is sub-round; both are below the median plane of the eye, and on a line slightly within the orbit. The mouth is large; the posterior extremity of the superior maxillary bone extends behind the orbit; the superior lip is tolerably thick and fleshy; the upper jaw is armed with a group, broad in front, of minute, villiform, pointed, and card-like or closely-set teeth, with several much larger or canine teeth in front, and in an outer row. The lower jaw is armed with a patch of teeth similar to those of the upper, but it has an internal row of larger teeth; these teeth are largest towards the commissure of the mouth. The vomer has a triangular patch of minute teeth in front; and the palate a long, narrow group of similar teeth on each side. The pharyngeals are armed with numerous small, pointed, and slightly recurved teeth.

The pre-opercle is large, and has two rounded projecting groups of radiating spines, like spurs, the first at its angle, and the second near the middle of its ascending border; between these two groups the margin is incurved, and armed with a few teeth, and above the superior group it is minutely serrated. The opercle is broad, and terminates behind in two flat spines, the lower one the longer, and from them projects the skin. The inter-opercle is broad and rounded below. The head above is covered with scales only to the posterior margin of the orbits, but nearly to their middle on the sides; the snout, jaws, &c. are naked. There are seven branchial rays; the supra-scapular is serrated.

The dorsal fin is single, long, and nearly of the same elevation throughout ; it begins with the pectoral, and ends before the base of the caudal fin ; it has ten delicate spines, the first and second shortest, and twelve soft rays. The pectoral is rather broad, rounded behind, and has fifteen rays. The ventral arises with the pectoral fin, and extends rather beyond it ; it has one spinous and five soft rays, of which the second and third are slightly prolonged. The anal begins nearly with the soft dorsal, but is not as long ; it has three delicate spines, the first minute, the second twice as long, and the third double the length of the second ; it has seven soft rays. The caudal is large and crescentic, with the extremities of the horns prolonged by two or three of the outer rays ; it has sixteen rays.

The scales are small, oblong, unguiform, rounded and ciliated behind, nearly straight before, with an undulated margin caused by twelve radiating lines. The lateral line corresponds with the outline of the back to the root of the tail, when it descends to the median plane ; its scale is sub-triangular with the apex behind, rounded, and ciliated ; the excretory duct terminates in three smaller tubes behind.

COLOUR. The ground colour along the back is brown, with a tint of fawn-colour, or it is bronzed ; the sides are fawn-colour above, silvery below the lateral line, and are marked with seven or eight horizontal lines of ultra-marine blue ; the first begins at the occiput, is slightly arched inwards, and ends about the sixth dorsal ray ; the second goes from the superior angle of the opercle, and is less arched ; the third departs from the middle of the posterior border of the opercle ; and the fourth from under its angle ; the three others become paler and paler, and finally disappear in the white colour of the belly ; the head above is marked with two or three lines of a similar colour, which run transversely ; or they form chevrons, with their angles directed forwards ; the dorsal fin is semi-transparent, and marked with alternate lines of pale blue and pale yellow ; the anal is transparent, and marked with pale yellow spots ; the caudal has numerous cupreous spots arranged in vertical lines ; the ventral is pale yellow in front, and white behind ; the posterior part of the palate and the branchial arches are pale yellow.

DIMENSIONS. There are three heads and a half between the angle of the opercle and the tip of the tail; the elevation is less than a head without the dorsal fin, and a head and one eighth with it; total length, fourteen inches.

SPLANCHNOLOGY. The liver is of large size, and the left lobe, which makes the greater portion of its bulk, extends half as far back as the stomach; the central portion is thick, joins the left lobe without a fissure, and seems to be continuous with it. The gall-bladder is a long tube, extending almost as far back as the stomach; it is narrow, and only becomes considerably developed at the right lobe of the liver. The stomach extends through nearly two thirds of the abdominal cavity; it is sub-cylindrical, pointed behind, with thick muscular walls; the pyloric portion goes off from behind the middle, and is short, sub-conical, with very thick walls, and has a remarkable contraction at the pylorus. The small intestine runs half-way to the vent, and then returns to the pylorus, whence it is reflected to end in the rectum, with an indistinct rectal valve. There are seven cæcal appendages, an inch or more long, though one is often in a rudimental state. The spleen is long, slender, closely connected to the small intestine and cæcal appendages. The air-bladder is large, as it extends the whole length of the abdomen; it is a little broader before than behind, and has exceedingly thin and transparent walls.

HABITS. Little can be said of the habits of this fish; it however appears in our waters in May or June, and remains until November; it is occasionally taken with the hook on the Black-fish grounds, but is never abundant.

GEOGRAPHICAL DISTRIBUTION. The *Squirrel-fish* is found along the Atlantic coast of America from Brazil to the Carolinas, which must for the present be considered as its extreme northern limit.

GENERAL REMARKS. This animal was first described by Cuvier and Valenciennes, in the second volume of their great work on Ichthyology, as the *Serranus fascicularis*; and subsequently, much more fully, in the seventh volume, from specimens taken in Carolina. Although the Squirrel-fish has many of the characters of the true Serrani, yet it differs from them in so many others, — as in its elongated form, and slightly compressed body, its long dorsal fin, and in the two rounded groups of radiating spines at its pre-opercle, — that I have established for it the genus *Diplectrum*.

GENUS POMOXIS. — *Rafinesque*.

CHARACTERS. Mouth large; lower jaw very prominent; maxillary, palatine, and vomerine teeth small, villiform; tongue armed with minute teeth near its root; pre-opercle minutely serrated; opercle bifurcate at its angle; anal spines more than three; body sub-oval, elevated, compressed; dorsal fin single, large, elevated, no depression between the spinous and branched rays; soft portion larger than the spinous; seven branchial rays.

REMARKS. This genus was established by Rafinesque to receive the *Pomoxis angularis*, which is, according to Agassiz, closely allied to the fish now under consideration.

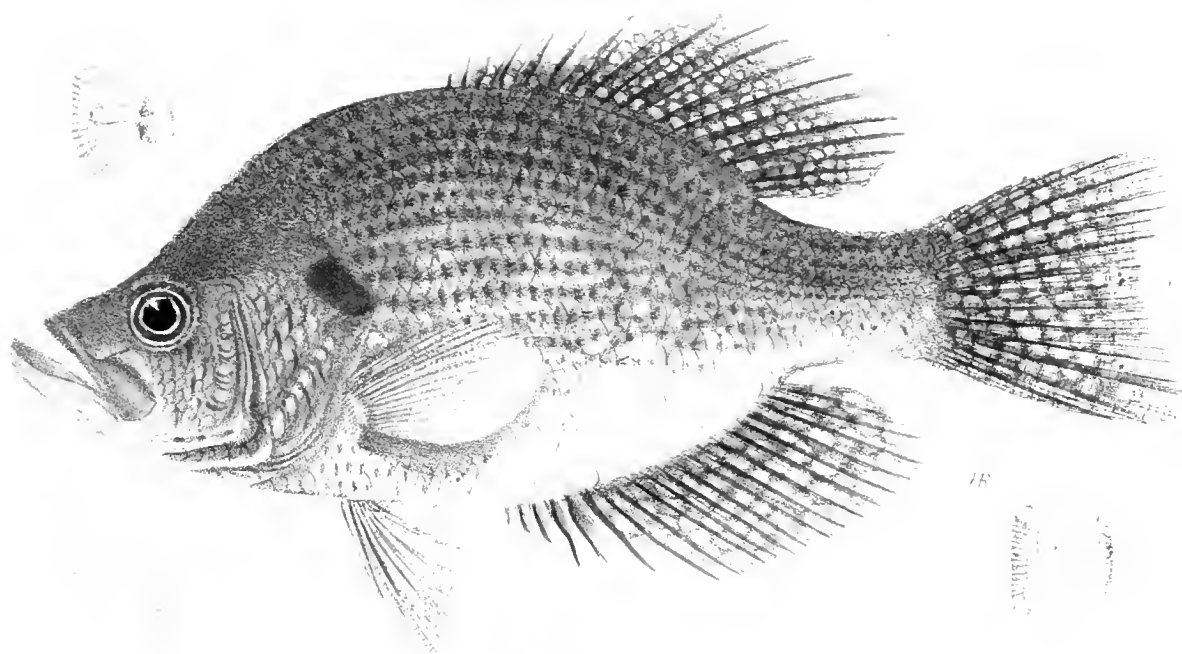
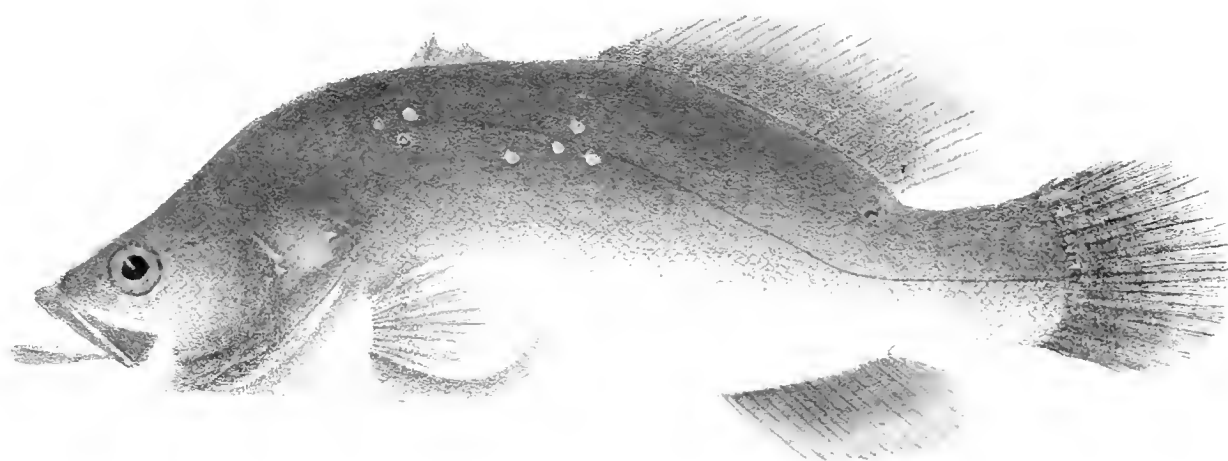
POMOXIS HEXACANTHUS. — *Cuv. et Val.*

Plate VI. Fig. 1.

SPECIFIC CHARACTERS. Anal fin with six spines; body above dusky, tinted with bluish-green; sides and belly silvery, and marked with oblong bluish-green blotches, disposed without regularity. D. 7-15. P. 12. V. 1-5. A. 6-17. C. 17.

SYNONYMES. *Centrarchus hexacanthus*, *Cuv. et Val.*, Hist. Nat. Poiss., tom. vii. p. 458, pl. 48.
Centrarchus sparoides, *Cuv. et Val.*, Hist. Nat. Poiss., tom. iii. p. 88.
Centrarchus hexacanthus, *Kirtland*, Bost. Jour. Nat. Hist., vol. iii. p. 480, pl. 29, fig. 2.
Centrarchus hexacanthus, *DeKay*, Zoöl. N. Y., part iv. p. 31.
Cichla Storeria, *Kirt.*, Rep. Zoöl. Ohio, p. 191.
Centrarchus hexacanthus, *Storer*, Synops., p. 38.
Goggle-eye, *Vulgo*.

Pl. VI



DESCRIPTION. This fish is of an ovoidal form, much compressed, arched, thin, both at the back and belly, the thickest part being just above the lateral line. The head is long, thin, elevated, but incurved above the eyes, and the snout is rounded, though narrow. The eye is very large, and near the facial outline, with its lower margin at the median plane of the head; the nostrils are round, very near together, and about midway between the eye and snout, though on a line within the orbit; the posterior is the larger.

The mouth, though compressed, is large, as the broad, posterior extremity of the upper jaw extends beyond the middle of the orbit. The lower jaw has a lip of tolerable thickness, and is so much longer than the upper as to make part of the facial outline above when the mouth is shut. There is a large pore on each side on the inferior face of the lower jaw. Both the upper and lower jaws are armed with broad patches of small, short, conical, pointed, and slightly recurved teeth, all nearly of the same size, except a few in front, which are a little longer than the others. The tongue is round and free in front, with two parallel groups of very minute teeth near its base. There is also a small patch of similar minute teeth on the vomer; and an elongated, extremely narrow group on each palate-bone. The pharyngeals are furnished with closely-set teeth, similar in form to those of the jaws, but some of them are rather larger.

The pre-opercle is but slightly rounded at its angle, where it is marked with minute serratures. The opercle is rather small, sub-triangular, its apex behind, and bifurcated in two nearly equal-sized flat spines. The sub-opercle is long, narrow, four-sided, and extends a little farther back than the opercle, and from it hangs most of the fleshy appendix. The inter-opercle is narrow and semicircular. The jugal bones are minutely serrated. The head is smooth above, but the checks, pre-opercle, and opercle are covered with scales; the sub-opercle has but a single row of large scales; there are several large water-pores along the sub-opercle, pre-opercle, and above, behind, and under the orbit, and below the inferior maxillary bone.

The dorsal fin is single, with its soft portion greatly elevated; it arises in a line nearly vertical with the middle of the pectoral, and has seven spines, the anterior minute, and fifteen soft rays. The pectoral begins at the opercle and extends to the root of the third dorsal spine; it has twelve rays. The ventral begins nearly in a line with the pectoral, and terminates with it at the first anal spine; it has one stout spine and five soft rays. The anal begins with the soft dorsal, though it continues farther back, and is more elevated; it has six spines and seventeen soft rays. The caudal is large, broad, slightly crescentic, and has seventeen rays.

The scales are nearly semicircular, with the diameter in front, rounded behind, and not ciliated. The lateral line is well marked; it corresponds with the dorsal outline, and runs near the junction of the middle and superior thirds of the body; its scales are sub-triangular, the bases before and the apices behind, and rounded or very slightly cordate; the excretory tube is single and large.

COLOUR. The head and body above are more or less dusky, and shaded with bluish-green; the lower jaw, sides, and belly are silvery, and marked with bluish-green blotches, more or less distinct, and placed without much regularity. The pectoral is of the faintest yellow tint; the ventral is yellowish, but very pale near its root, and bluish at its extremity; the dorsal is semi-transparent, rather dusky, and with numerous yellowish spots, more or less bright, in the connecting membrane of the rays, those near the root of the fin being brightest; the anal is coloured like the dorsal; the caudal is like the anal, but more dusky.

DIMENSIONS. The length from the opercle to the tip of the caudal fin is equal to two heads and a half; the elevation, to one head and a quarter; total length, twelve inches.

SPLANCHNOLOGY. The liver is of moderate size, and without any marks of lobes in front; but its posterior margin is subdivided into three lobes, of which the left is longest and the right shortest. The gall-bladder is large, round, with very thin walls, near the right lobe, and partly concealed by it. The stomach is large, broad, thick, and with firm walls, especially behind the pyloric portion, which is short and goes off at a right angle rather beyond its middle. The pyloric valve is well

marked. The small intestine runs nearly to the vent ; it is then reflected to the pylorus, whence it returns to end in the rectum without a valve. There are eight long, slender, delicate cæcal appendages. The spleen is small, flattened, very dark, and is placed mostly on the left side. The air-bladder is very extensive, with thin walls ; it is rounded in front, but behind it bifurcates into two horns, which are prolonged for some distance on each side of the origin of the anal fin. The ovaries are large, conical, and rather flattened. The urinary bladder is large.

HABITS. The *Goggle-eye* inhabits ponds and streams of running water, though perhaps it prefers the former ; it feeds on various insects.

GEOGRAPHICAL DISTRIBUTION. The *Pomoxis hexacanthus* has a wide geographical range. Sir John Richardson found it in Lake Huron, Lesueur in the Wabash River, Bosc in Carolina, and Professor Agassiz has received it from Lake Erie.

GENERAL REMARKS. Cuvier and Valenciennes gave the first description of this animal, and, supposing it to be identical with the *Labrus sparoides* of Lacépède, which is a Carolina fish, they continued his specific name. But subsequent examinations convinced them of their error, and then they applied to it the specific name *hexacanthus*.

GENUS RYPTICUS. — *Cuvier*.

CHARACTERS. Opercle and pre-opercle furnished with spines, but neither is serrated ; teeth small, villiform ; scales minute, and imbedded in the epidermis ; dorsal fin with never more than four spines ; branchial rays seven.

RYPTICUS MACULATUS. — *Holbrook*.

Plate VI. Fig. 2.

SPECIFIC CHARACTERS. Dorsal fin with two spines ; head and body above olive-brown, with whitish spots scattered above the median plane ; lower jaw and belly pale drab-colour. D. 2-25. P. 15. V. 1-5. A. 15. C. 16.

DESCRIPTION. This fish is of a semi-oval form, compressed, very regularly arched above, from the snout to the root of the caudal fin, and nearly straight below; it is rather thicker at the back than at the belly. The head is long, narrow, not much elevated, especially between the eyes, and the snout is rounded. The eye is very large, prominent, near the facial outline, with its inferior margin above the median plane of the head; it is about one diameter of the orbit from the snout, and two diameters and a half from the posterior border of the bony opercle; the iris is reddish-brown, with a greenish tint, and the pupil is dark. The nostrils are very small, round, and near the orbit.

The mouth, though compressed, is large, and the broad posterior extremity of the superior maxillary bone extends beyond the orbit. The lower jaw is longer than the upper, and projects so far beyond it, when the mouth is shut, as to make part of the facial outline; both are armed with numerous crowded, villiform teeth. The vomer is furnished with a large, sub-triangular group; and the palate-bones have each a large, slender patch of similar teeth, and the pharyngeal bones are armed with teeth of the same form. The tongue is rather long, narrow, smooth, and very free. The pre-opercle is rounded both behind and below, and is furnished with two stout spines near the superior part of its ascending border. The opercle is sub-quadrilateral, with three spines behind, of which the central is longest, and from them is extended a triangular fold of skin. The sub-opercle is quadrilateral, though rather rounded behind. The inter-opercle is semi-lunar. The gill-openings are large; there are seven branchial rays.

The dorsal fin is single, entire, and very long, as it begins nearly on a line vertical with the anterior fourth of the pectoral, and extends almost to the root of the caudal; it has two short spines, that are so far removed from its soft portion as to represent an anterior dorsal, and it thus differs entirely from the *Rypticus saponaceus* of Cuvier and Valenciennes; it has twenty-five soft rays, mostly covered with skin. The pectoral is large, broad, and rounded behind; it begins at the soft appendix of the opercle, and has fifteen rays. The ventrals are very small, near together, and begin rather before the pectorals, but are only about half as long;

they have each one spine and five soft rays. The anal is very short, though as much elevated as the dorsal, with which it is coterminous behind; it has fifteen rays, but no spine. The caudal is broad and rounded behind, with sixteen rays.

The scales are minute, and are deeply embedded in the epidermis, and are at all times covered with a thick mucous secretion. The lateral line is arched, and elevated opposite the dorsal spines, but it gradually descends to the median plane.

COLOUR. The head above, as well as the upper half of the body, is olive-brown, with several whitish spots above the median plane; the lower jaw and belly are pale drab colour; the pectoral fin is dusky at its root, and reddish-brown at its margin; the ventral is pale reddish-brown before, and white behind; the roots of the dorsal and of the anal fins are olive-brown, and the external half of each is olive-colour; the caudal is olive-brown.

DIMENSIONS. The entire length, from the spine of the opercle to the tip of the caudal, is equal to three heads and a quarter; the greatest elevation, without the dorsal fin, is one head and one third; total length, eight inches.

SPLANCHNOLOGY. The liver is very large, compressed, and appears as one mass at first sight, since the marks of separation into lobes can be seen from above only, where the left lobe sends a small lobule upwards and forwards; the right lobe is about half as long as the left, and terminates behind in two lobules, while the left ends in a point. The gall-bladder is slender and rather long. The stomach is large and long, as it extends three fourths the length of the abdomen, and is pointed behind; its walls are very thick, and there are strong longitudinal folds on its inner surface; the pyloric portion is small, slender, short, and has thinner walls; the intestine runs to the vent, and is then reflected nearly to the diaphragm, whence it returns to end in the rectum, which is very short, and has a remarkable rectal valve; there are four small cæcal appendages. The air-bladder is very large, extending the whole length of the abdomen; it is sub-conical in form, the base is anterior and rounded, and the apex behind and pointed; its walls are thin.

HABITS. Nothing is known of the habits of the *Rypticus maculatus*.

GEOGRAPHICAL DISTRIBUTION. This fish has been observed only on the coast of South Carolina.

GENERAL REMARKS. The *Rypticus maculatus* is the only species of the genus, hitherto observed in our waters; and of this species I have only seen one, which was taken off Cape Romain. At first sight, it bears a striking resemblance to the *Rypticus saponaceus* of Cuvier and Valenciennes, yet it differs from that animal in its colour; in the number and disposition of its dorsal spines; and in the form of its air-bladder.

GENUS CENTROPRISTES. — *Cuvier*.

CHARACTERS. Maxillary, inter-maxillary, palatine, and vomerine teeth nearly of the same size; pre-opercle dentated; opercle with spines; dorsal fin single; branchial rays seven.

CENTROPRISTES ATRARIUS. — *Linnaeus*.

Plate VII. Fig. 2.

SPECIFIC CHARACTERS. Head and mouth very large; back arched; sides bluish-black above, lighter below; membrane of dorsal fin dusky, with irregular whitish lines. D. 10 – 11. P. 18. V. 15. A. 3 – 4. C. 17.

SYNONYMES. *Perca atraria*, *Lin.*, Syst. Nat., tom. i. p. 485.
Perca atraria, *Gmel.*, Ed. Syst. Nat., tom. i. pars iii. p. 1314.
Lutjan trilobé, *Lacép.*, Hist. Nat. Poiss., tom. iv. p. 137.
Centropristes nigricans, *Cuv. et Val.*, Hist. Nat. Poiss., tom. iii. p. 37, pl. 44.
Centropristes nigricans, *DeKay*, Zoöl. N. Y., part iv. p. 24, pl. 2, fig. 5.
Centropristes nigricans, *Storer*, Synops., p. 35.
 Black-fish, *Vulgo*.

DESCRIPTION. The form of this fish is somewhat oblong, but when its capacious mouth and large gill-openings are extended, it appears almost sub-triangular. The head is very large, and more or less elevated between the eyes, with the snout full and rounded. The eye is large and prominent; the pupil is deep sea-blue, and the iris a dusky grey, with an inner margin of bright yellow. The nostrils are closely approximated, and on a line within the superior border of the orbit, though on a plane rather below it; the posterior is sub-round, the anterior and smaller is round, and about half way between the orbit and snout. The mouth is very large; the lips are thin; the upper jaw is protractile, the lower is rather the longer; and both are furnished with numerous irregular series of small, closely set, conical, sharp-pointed, and recurved teeth, all nearly of the same size, except those of the external row, which are larger, farther apart, and less pointed. The vomer has in front a triangular group; and the palate-bones have an oblong patch of similar teeth, the latter being rather shorter and more scattered. The pharyngeal bones are covered with teeth of similar form, but directed more backwards, and some few along their inner margins are rather longer and more slender.

. The pre-opercle is rounded at its angle, with its ascending border vertical, or directed slightly backwards; both angle and border are finely serrated, the serratures being rather larger below. The bony opercle terminates in two flat, exposed spines, the superior larger, the inferior very small, but the skin is continued beyond the superior for some little distance, and ends in an obtuse point. The whole head is covered with scales, except the cheeks, snout, and the space between the eyes; those on the opercle are nearly as large as the scales of the body. The gill-openings are exceedingly capacious; there are seven branchial rays; the supra-scapular bone is rather large, and serrated behind.

The body is short and thick; the shoulders are much elevated, but descend rapidly towards the tail. The dorsal fin begins above the root of the pectoral, and ends about an inch before the caudal, though, when folded, the tips of the last rays reach it; it has ten spines, the anterior very short, and the third longest, and each has a small delicate filament near its tip; there are eleven soft rays, the

seventh, eighth, and ninth prolonged to make the fin end in a point. The pectoral is rather large, broad, rounded posteriorly, and extends beyond the vent; it has eighteen rays. The ventral is broad and strong; it begins with the pectoral, and terminates in a point before the vent, and has one spine and five soft rays. The anal arises nearly opposite the junction of the spinous and soft portions of the dorsal fin, and has two spines, the anterior very short, and seven soft rays; the third and fourth are prolonged, and give a pointed form to the end of the fin. The dorsal, pectoral, and anal fins are covered with scales for nearly one fourth of their extent. The caudal has seventeen rays, and is trilobate when perfect, as the upper and lower margins are prolonged, and the central portion is rounded and projecting; this shape of the tail is not, however, always present; when not, its border is irregular.

The scales are large, sub-pentagonal, rounded behind, and finely ciliated. The lateral line is concurrent with the back, and runs along the upper third of the body to the extremity of the origin of the dorsal fin, where it descends to the median plane; its scales are smaller than the others, sub-round, with the ciliated portion prolonged, and more or less notched.

COLOUR. The Black-fish presents some variety in its colour, but is in general dusky-brown, or even bluish-black along the back. Each scale has a dusky margin, with a transparent spot in its middle, that allows the black skin to be seen under it; the dark margin in the scales below the lateral line is very small, and consequently the sides and belly are of a much lighter colour than along the back, where the transparent spot is but small. The head is dusky above, often tinted with green or olive. The tongue is white, though the roof of the mouth and the fauces both above and below are pale yellow. The membrane of the dorsal fin is dusky, often with a bluish tint, and has several series of elongated spots of a pale olive-colour or dirty white, which are so disposed as to make three longitudinal interrupted lines in the spinous, and five in the soft portion. The anal fin is also dusky, with similar lines, but less distinct and regular; the other fins are more or less dusky.

DIMENSIONS. The length from the opercle to the tip of the tail is equal to three heads; the elevation, without the dorsal fin, to one head and one twentieth; total length, twenty inches.

SPLANCHNOLOGY. The liver is large, and of rather a pale colour; the transverse portion is thick, and joined without a fissure to the left lobe, which is tolerably thick and subtriangular in front, slender and pointed at its termination, which is rather beyond the anterior third of the abdomen; the right lobe is about half as long, and both project pointedly into the hypochondriac regions at their superior part. The gall-bladder is large, and situated behind the right lobe, even as far back as the posterior extremity of the left. The stomach is large, and ends in a point at the posterior fourth of the abdomen; the pyloric branch is short, goes off at an acute angle from its posterior third, and is nearly as broad as the stomach itself; it has thick walls, and is greatly contracted at the pylorus. The small intestine runs to the vent; it is then reflected to the pylorus, whence it returns to end in the rectum. There are seven cæcal appendages. The spleen is small, dark purple, sub-oval, flattened, with acute margins, and is concealed by the last convolution of the small intestine. The air-bladder is large, oblong, with two or three small pouches or sacks on each side of its anterior part; the most anterior of these are the largest. The testicles are oblong, pointed before, and unite far back. The kidneys are narrow; and the ureters are slightly developed behind, and make a small urinary bladder.

HABITS. The *Black-fish* is very voracious; it feeds on any animal substance whatever, whether dead or alive, and is consequently easily taken with the hook. In its stomach I have often found small fish of various genera, and parts of such as were too large to be swallowed whole, as well as small crabs, shrimps, &c. It abounds in shallow, as well as in deep waters, even of twenty-five fathoms or more, where the largest are taken; but fish of a smaller size are caught in the mouth of our river, or even from the wharves of our city. It is so abundant, that it may be found every day in our market, and is always sold alive; and yet, notwithstanding the many thus destroyed, it is so prolific that its numbers appear undiminished.

GEOGRAPHICAL DISTRIBUTION. The *Centropristes atrarius* inhabits the Atlantic coast of the United States, from Cape Florida to Cape Fear in North Carolina, which must for the present be considered as its northernmost limit.

GENERAL REMARKS. This animal, it appears to me, is the *Perca atraria* of Linnæus, which, he says, was sent him from Charleston, by Dr. Garden, who called it *Black-fish*; a name in fact applied to it from the earliest settlement of our State. Nor is there any other fish of this same colour, with which it could possibly be confounded, the *Tautoga Americana* excepted; but this animal was not introduced to our waters until about fifty years since.*

In 1788, Schoepff† described a fish that he found in the waters of New York, there called, as he says, “*Sea Bass* or *Black-fish*,” and which he supposed to be an undescribed species, for he observes, — “The *Carolina Black-fish* of Dr. Garden, or *Perca atraria*, L., seems in some particulars to approach near it; but in the number and character of its fin-rays is widely different.” This fish of Schoepff is also the *Coryphæna nigrescens* of Bloch; the *Perca varia* of Mitchill; and the *Centropristes nigricans* of Cuvier and Valenciennes, which they describe as identical with the *Perca atraria* of Linnæus, and in this they have been followed by all our ichthyologists. In fact, these two fishes are so much alike in form, colour, &c., as hardly to be distinguished at first sight; yet they are not only different animals, but have an entirely different geographical distribution; the one inhabits the waters north of Cape Hatteras, while the other is only found south of it. The external mark most to be relied on, in determining these species, is the comparative length of the pectoral fin, which is longer than the ventral in the Southern species, and coterminous with it in the Northern. But the most distinctive character is found in the shape of the air-bladder, which is always sacculated in the *Centropristes atrarius*, and never in the *Centropristes nigricans*.

* In the year 1800, General Thomas Pinckney imported from Rhode Island several hundred *Tautog*, together with many *Lobsters*. These he distributed in the sea at the eastern extremity of Sullivan’s Island; the lobsters soon died out, but the fish increased and multiplied, and are now common, though not abundant.

† Schrift. der Gesells. Nat. Freund., b. viii. st. 2, p. 164.

CENTROPRISTES TRIFURCA. — *Linnaeus*.

SPECIFIC CHARACTERS. Body marked with seven dusky bars; dorsal spines with filaments, those of the third, fourth, and fifth as long as the spines themselves; tail trifurcate. D. 10–11. P. 17. V. 1–5. A. 3–10. C. 16.

SYNONYMES. *Perca trifurca*, *Lin.*, Syst. Nat., tom. i. p. 489.

Perca trifurca, *Gmel.*, Ed. Syst. Nat., tom. i. pars iii. p. 1316.

Lutjanus tridens, *Lacép.*, Hist. Nat. Poiss., tom. ii. p. 137.

Centropristes trifurca, *Cur. et Val.*, Hist. Nat. Poiss., tom. iii. p. 43.

Centropristes trifurca, *DeKay*, Zoöl. N. Y., part iv. p. 25.

Centropristes trifurca, *Storer*, Synops., p. 35.

Rock Black-fish, *Vulgo*.

DESCRIPTION. The form of this fish is more oblong, and the outline of the back is much less arched, than in the preceding species; the head is also smaller, less prominent, or is even flattened between the eyes; and the snout, instead of being rounded, is truncated. The eyes are very large and prominent, and their upper margin is on a plane with the outline of the head above; the pupil is black and the iris golden, intermixed with grey. The posterior nostril is round, and about the middle plane of the eye; the anterior is the smaller, and is placed on a line without the superciliary ridge, and about midway between the orbit and snout, but on a line rather within the edge of the orbit.

The mouth is large, the posterior extremity of the upper jaw reaching to the middle of the orbit. The upper jaw is protractile, though less so than in *Centropristes atrarius*, and the lower projects slightly beyond the upper; both are armed with numerous small, sharp-pointed teeth, nearly all of the same size, except the anterior, which are slightly longer than the rest. The tongue is small, very narrow, triangular, smooth, thick at its root, pointed, and very free in front. The preopercle has its angle rounded and minutely serrated, with its ascending border

directed a little forwards, and finely serrated. The opercle is sub-triangular, prolonged behind in a round fleshy appendix, and furnished with two flat spines placed near together; the superior is large, and the inferior minute. The head is covered with scales, except the snout, cheeks, and under the eyes to the upper jaw, and between the eyes; those of the opercle are large, except near the angle, where they are small. The gill-openings are very extensive; there are seven branchial rays; the supra-scapular is small, but strongly serrated behind.

The dorsal fin is long, and begins rather before the termination of the fleshy opercle, and ends in a point at the root of the caudal; it has ten compressed, slightly curved, sharp-pointed spines, of which the anterior is very short, the second twice its length, and the third and fourth are double the length of the second; from this they gradually decrease to the tenth; each spine has a delicate filament appended to it, which in the third, fourth, and fifth are as long as the spines themselves; the soft portion has eleven rays; the seventh, eighth, and ninth are prolonged, and give a pointed form to the fin. The pectoral fin is long, broad, rounded behind, and ends before the vent; it has sixteen rays, with a semicircular fold of skin in the axilla above. The ventral is short, rather broad, and begins with the pectoral, but is shorter and has one spine and five soft rays. The anal is very long; it arises nearly opposite the root of the third dorsal soft ray, and extends almost to the root of the caudal; it has three spines, the anterior very small, and eight soft rays, of which the fourth, fifth, and sixth are prolonged like the dorsal fin. The caudal is elongated, with sixteen rays; those of the margin above and below, as well as some of the central ones, are so prolonged as to give the tail a tridentate appearance.

The scales are rather large, sub-pentagonal, with two faces of the pentagon meeting at a very obtuse angle behind, where it is finely but strongly serrated; its anterior margin has eight radiating striæ. The lateral line is concurrent with the back, and at about the upper third of the body; its scale is sub-triangular, with its base before, and its apex behind and rounded; the tube is near its middle.

COLOUR. The head is of a bronzed colour above, and marked with cupreous lines from the eye to the upper jaw and lip, which is of a coppery tint along its inferior border; the root of the tongue, the branchial arches, as well as the roof of the mouth, are bright yellow; the lower jaw is white; the body above the lateral line is gray, with a purple tint; below the lateral line it is silvery; the sides are marked with six dusky-gray vertical bars, darkest near the back; the membrane uniting the spines of the dorsal fin is transparent in front, or shaded with olive spots; and behind, near the root of the three last spines, is an irregular black spot; the filaments of the spines are red; the soft portion of the dorsal is transparent, with a row of cupreous spots near its base, and spots of similar colour are disposed without regularity near its margin, which is also cupreous; the pectoral is transparent; the ventral is white, tinted blue in its posterior third, and yellow in its anterior part; the lateral line is marked by a succession of oblong dark spots arranged in pairs; the anal is semi-transparent, with a broad yellow band passing through its middle, above which it is white, and the margin is blue; the tail is of a pale bluish tint, more or less transparent, with many yellowish-orange spots.

DIMENSIONS. The length from the opercle to the root of the caudal fin is equal to two heads; the greatest elevation of the body is one sixth of a head; total length, twelve inches.

SPLANCHNOLOGY. The liver is large and of a very pale colour; it consists of two lobes, with a central or transverse portion, so joined to the left lobe as to leave no mark of separation, and making with it more than four fifths of the organ; the right lobe is exceedingly small, and is separated from the central part by a well-marked fissure; both lobes send processes into the hypochondria, but that of the right is very short. The gall-bladder is but a long, narrow tube, reaching nearly half the length of the abdominal cavity; the stomach is large, long, sub-cylindrical, though pointed behind, and has thick walls; its pyloric branch departs rather in front of its posterior third, is very short, and has its pyloric contraction well marked. The air-bladder is very small, and has thin walls.

HABITS. The *Centropristes trifurca*, unlike the last-described animal, is never found, so far as I know, in deep water, but is common in the harbour of Charleston; yet it is only seen in the summer months, and is never abundant; parts of crustaceous animals, as well as small fish, have been found in its stomach.

GEOGRAPHICAL DISTRIBUTION. This fish has been hitherto observed only in the waters of South Carolina and Georgia.

GENERAL REMARKS. The *Centropristes trifurca* was first described by Linnæus, and succeeding naturalists have, to this time, only copied his description.

FAMILY SPARIDÆ. — Cuvier.

CHARACTERS. Jaws not protractile; neither vomerine nor palatine teeth; preopercle and opercle without spines or serratures; dorsal fin single; scales ctenoid and large; branchial rays never more than six.

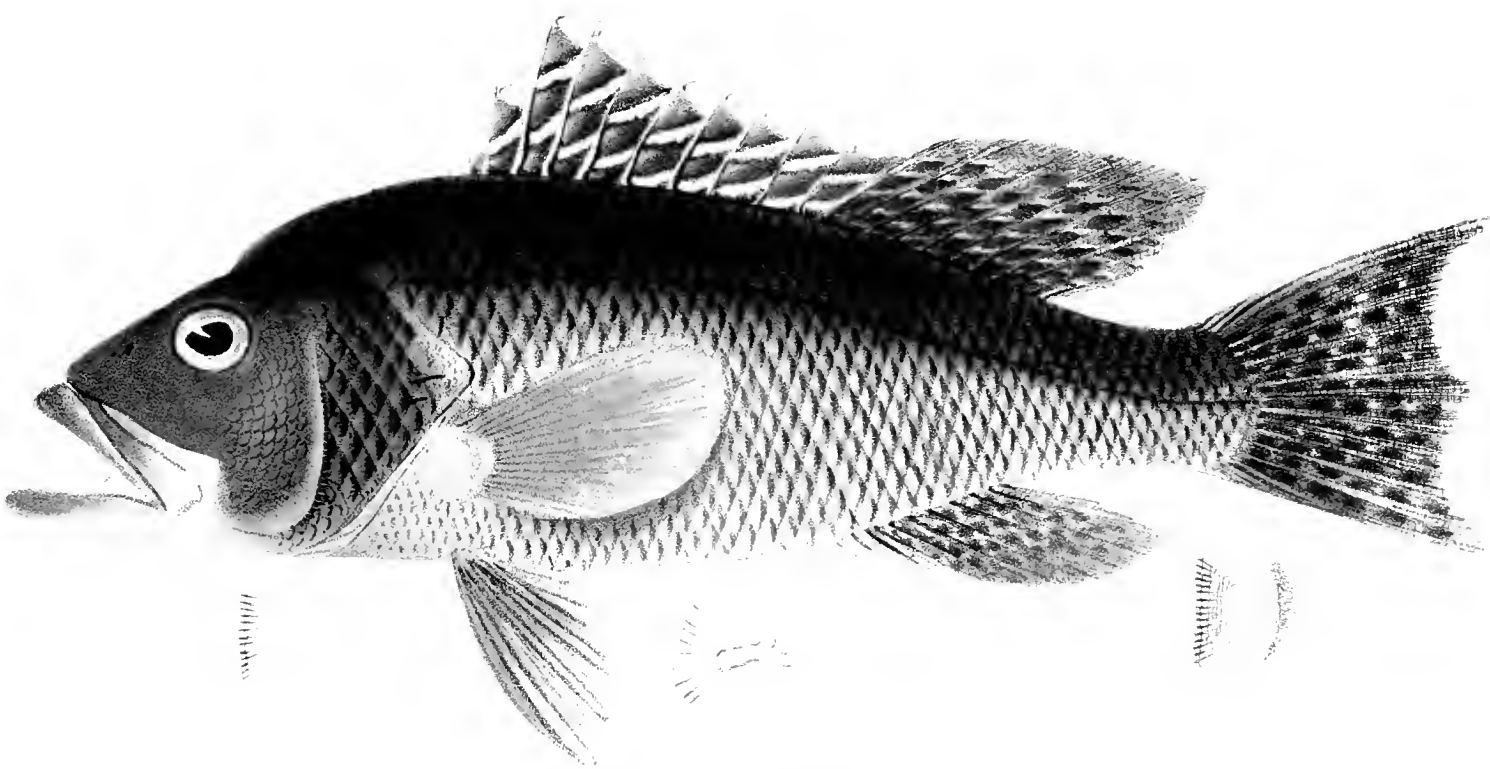
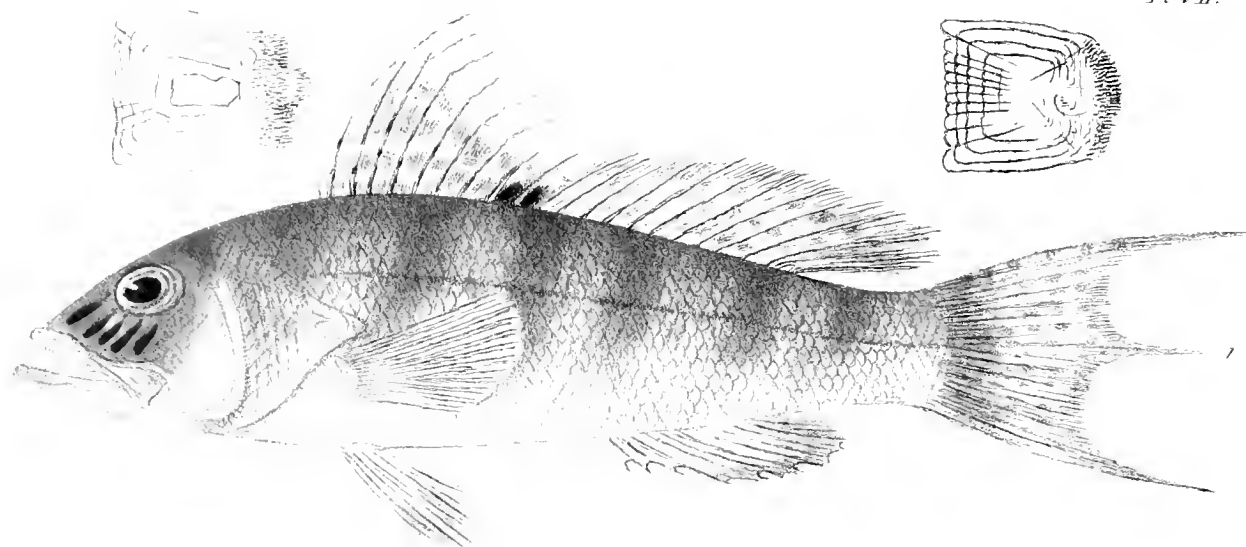
REMARKS. This family was founded by Cuvier, chiefly on the genus Sparus of Artedi, the celebrated Swedish ichthyologist, to include only those species with non-protractile jaws, and it comprises several genera. Prior to the publication of the work of Cuvier and Valenciennes, there existed in no family of fishes so much confusion; nor any in which such a number of animals belonging to entirely different genera and families were included. It is especially Valenciennes, one of the best ichthyologists of our time, who, by his researches, has cleared up the obscurity that rested on this subject.*

GENUS SARGUS. — Klein.

CHARACTERS. Jaws not protractile; trenchant incisor teeth in both jaws; molar teeth in several series, sub-conical, rounded at their apices and paved; branchial rays five.

* Hist. Nat. Poiss., tom. vi. p. 1 *et seq.*

Pl VII.



REMARKS. Klein established his genus *Sargus*, to receive certain fishes with flattened, truncated, incisor teeth, and he consequently included in it many fishes having this character in common, although they belong in reality to very different genera. It was Cuvier who first restricted this genus within the proper natural limits above stated.

SARGUS OVIS. — *Mitchill*.

Plate VIII. fig. 2.

SPECIFIC CHARACTERS. Form semi-oval, compressed; head dusky above; body grey above, silvery-white at the sides, with six or seven vertical dusky bars; belly white; mouth small, with six or eight quadrilateral, trenchant, incisor teeth in each jaw; and two or three rows of rounded, sub-conical, paved, molar teeth. D. 12–12. P. 16. V. 1–5. A. 3–11. C. 17.

SYNONYMES. Sparus, Sheepshead, *Schoepff*, Schrift. der Gesells. Nat. Freund., b. vii. st. ii. p. 152.
Sargus ovis, *Mitch.*, Trans. Lit. et Phil. Soc. N. Y., vol. i. p. 392, pl. 11, fig. 5.
Sargus ovis, *Cur. et Val.*, Hist. Nat. Poiss., tom. vi. p. 53.
Sargus ovis, *Storer*, Report, &c., p. 36.
Sargus ovis, *DeKay*, Zool. N. Y., part iv. p. 89, pl. 8, fig. 23.
Sargus ovis, *Ayres*, Bost. Jour. Nat. Hist., vol. iv. p. 260.
Sargus ovis, *Storer*, Synops., p. 80.
Sheepshead, *Vulgo*.

DESCRIPTION. This fish is of a semi-oval form, compressed, thicker and nearly straight at the belly, thinner and greatly arched along the back, with its greatest elevation opposite the sixth dorsal spine. The head is large, compressed, elevated, full between the orbits, which are prominent, and with the snout rather narrow, though rounded. The eyes are large, near the facial outline, and about three diameters of the orbit above the angle of the pre-opercle, three from the anterior extremities of the incisor teeth, and two diameters from the angle of the opercle. The pupil is deep sea-blue, and the iris silver-grey, with an internal golden margin.

The nostrils are double; the posterior and larger is a narrow, elliptical fissure, nearly horizontal, but a little higher behind, and placed near the orbit, though about the median plane of the eye; the anterior is small, round, and on the same level, but nearer the mesial line.

The mouth is small, as it does not extend as far back as the anterior nostril; the lips are thick and fleshy, but not protractile. The lower jaw is rather shorter than the upper, and both are armed with four incisor and two canine teeth; the latter are turned inwards; within these are two or three series of short, stout, sub-conical teeth, round at their tips, and disposed like paving-stones. There are neither vomerine nor palatine teeth; but the pharyngeal bones are provided with numerous conical, pointed, recurved teeth. The tongue is soft, smooth, thick, round in front, and but slightly movable.

The pre-opercle is rounded at its angle, with its ascending border nearly vertical, or but slightly directed forwards, and is marked with depressions and radiating elevations. The opercle is narrow in the antero-posterior direction, and terminates behind in an obtuse angle; it is covered with scales, but the rest of the head is smooth, except a patch of four or five rows of scales, which run from the anterior margin of the pre-opercle, between the posterior part of the orbit and the commissure of the mouth. The gill-openings are large; there are five branchial rays. From the *supra-scapular* ascends forwards a remarkable row of large scales, that marks the limit of the head; in front of this row are two or three series of smaller scales.

The dorsal fin is single, elevated, large, and preceded by a short recumbent spine, often concealed by flesh; it begins with the pectoral, and ends behind with the anal; it has twelve spines, the anterior short, and the fifth longest; they are all convex in front, concave behind, flattened at the sides, or ensiform in shape, and all are received in a groove when the fin is closed; the soft portion is round at its extremity, and has twelve rays, with their inferior fifth protected by a wall of scales, but without any attachment. The pectoral is long, narrow, sub-falciform,

thick at its root, and terminates pointedly behind ; it has sixteen rays. The ventral fin is large ; it begins nearly opposite the origin of the fourth dorsal spine, and has five soft rays, with one spine about three fourths their length ; in the axilla above there is a long, narrow, bony plate, nearly half as long as the fin, and covered with scales. The anal arises in a line behind the origin of the soft portion of the dorsal, and has three spines ; the anterior is very small, the second long, broad, strong, and the third as long as the second, but more slender ; there are eleven soft rays, the anterior of which, as well as the spines, is received in a groove when the fin is closed ; but the others have their roots only protected by scales, for one fifth their distance, making an imperfect groove. The caudal is strong, forked, covered with adherent scales for some distance, and has seventeen rays.

The scales are sub-quadrilateral, rounded behind, with a soft, ciliated margin, and slightly concave before ; they are large, tolerably adherent, and are so imbricated as to have a sub-rhomboid appearance. The lateral line is concurrent with the outline of the back, and runs along the upper third of the body, to the origin of the last dorsal ray, when it descends to the median plane ; its scale is smaller than those of the body in general, and has its tube beginning with several branches behind, and ending in a large duct in front.

COLOUR. The head is rather dusky above, and often with a bronzed or greenish tint ; the body is silver-grey above, more or less dark, and shining silvery-white at the sides, and marked with seven transverse, bluish-black bars ; the first runs from the shoulders to the gill-openings ; the second, from the anterior part of the spinous dorsal to behind the root of the pectoral fin ; the third, from the sixth dorsal spine to the middle of the pectoral ; the fourth, from the ninth spine of the dorsal to the posterior extremity of the pectoral ; the fifth passes from the three or four first rays of the dorsal to corresponding rays of the anal fin ; the sixth, from the extremity of the dorsal to the extremity of the anal ; and the seventh is placed at the root of the caudal fin ; all these bands are directed a little backward, except the last two, which are vertical. The old animal becomes more dusky, the head is

almost black, and the silver colour of the sides of the body quite a dusky-grey. The membrane of the spinous part of the dorsal is semi-transparent, with occasional faint tints of palest olive, or bluish-brown; the spines are white at their tip; the soft portion is semi-transparent, slightly shaded with dusky-grey; the pectoral is black at its root only; the rest is semi-transparent, and in places more or less shaded; the ventral has the spines and rays of a light colour, and the membrane of a bluish tint, almost white behind; the second anal spine is dirty white, the rays and membrane bluish-black, with occasional lighter tints.

DIMENSIONS. The head is one fourth of the entire length; the elevation of the body is rather more than one head and a half, without the dorsal fin, and nearly two heads with it; total length, two feet.

SPLANCHNOLOGY. The peritoneum is silvery, pointed with innumerable black dots, so as to give it a dusky tinge. The stomach is rather small, and does not extend more than half the length of the abdomen; its walls are not very thick; the pyloric portion begins far back, is narrower than the stomach, and has thicker walls. The small intestine is long, more than twice the length of the body, and makes several convolutions, connected by a loose fold of mesentery. The liver is of moderate size; the left lobe is the largest, though it does not extend as far back as the stomach; the transverse portion is thick, and projects backwards to make a kind of third lobe; the right lobe is smaller, and has a deep fissure between it and the middle portion; both lobes send pointed prolongations to the hypochondria, especially the left; the gall-bladder is long, sub-cylindrical, and convoluted at the place where it terminates in the cystic duct, which is also long and large. The air-bladder is large, and terminates rather broad in front, with a small, short, delicate horn, ascending perpendicularly before the anterior rib; its walls are remarkably thick and strong; its inner membrane is very delicate, and can be easily separated from the external; on its internal and inferior face is a large vascular ganglion; the testicles unite behind, and open into a large cavity; the ureters unite in one, and thus open into a large urinary bladder.

GEOGRAPHICAL DISTRIBUTION. The *Sargus ovis* inhabits the Atlantic shores of America, from Massachusetts, where it has been observed by Dr. Storer, to Cape Florida, where it has been seen by Major Leconte; from this it ranges along the northern shores of the Gulf of Mexico, even as far west as Lake Pontchartrain, near New Orleans.

GENERAL REMARKS. Schoepff, in his *Memoir* on the Fishes of New York, so long ago as 1778, gave a good description of our animal, in which he says, "It is called *Sheepshead*"; and he further observes, "Common and well known as this fish is, in most regions of America, it seems not yet to have been described." If it appeared to Schoepff remarkable that no one had given a description of the *Sheepshead*, it is still more so to us, that a fish so large, one so sought after for the table, and sold almost daily in our markets, should never have been noticed by ichthyologists, from that time to 1817, when Dr. Mitchill gave a good description of it from recent specimens, and accompanied it with a tolerable figure.

HABITS. The *Sheepshead* appears in the neighbourhood of Charleston in April, and continues until November, though farther south it doubtless remains the whole year, as it has been taken in Port Royal Sound as early as January. It enters shallow inlets and mouths of rivers, but never leaves the salt for fresh water; it prefers rocky bottoms or sheltered places for its residence; the wreck of some old vessel is always a favorite resort, either from the protection it affords, or because barnacles and other shells, the natural food of the animal, soon collect about it. Major Leconte informs me that these fish are exceedingly numerous along the inlets of Southern Florida, where the roots of the mangrove-trees are broadly extended into the salt water, and covered with barnacles. Mr. Elliott,* in his charming little work, which I advise all sportsmen to read, observes that "they were formerly taken in considerable numbers among our various inlets, into which large trees had fallen, to which the barnacles soon became attached; but as the lands have been cleared for the cultivation of sea-island cotton, the trees have disappeared, and with them the fish; and it has been found necessary to renew their feeding grounds by artificial means." Thus, "logs of oak or pine are formed into a sort of hut without a roof, five or six feet high; it is floored, and then floated to the place desired, and sunk in eight feet water, by casting stones or live oak timber within; as soon as the barnacles are formed, which will happen in a few weeks, the fish will begin to resort to the ground." It is sometimes necessary to protect the fish from their great enemies, Porpoises and Sharks, and this is done

* Carolina Sports, by Land and Water, by the Hon. William Elliott, of Beaufort, S. C.

either by placing "two of these pens near each other," or "by surrounding the pen with piles driven close together."

At present the best fishing-ground for the Sheepshead in South Carolina is the Breakwater at Sullivan's Island, or the foundation rocks of Fort Sumpter at the entrance of Charleston Harbour. The Sheepshead is a very wary fish, and takes the bait cautiously; but once hooked, it affords much sport to the fisherman in its attempts at escape, and it is always necessary to have strong tackle, otherwise the line might be cut with its sharp and strong incisor teeth. The flesh is good, but by no means as delicate and savoury as the Crevallé; nor do I think this fish at Charleston equal in delicacy and flavor to the same fish at New York, which may depend either on the nature or abundance of its food, or on the colder waters of the latter region.

GENUS LAGODON. — *Holbrook.*

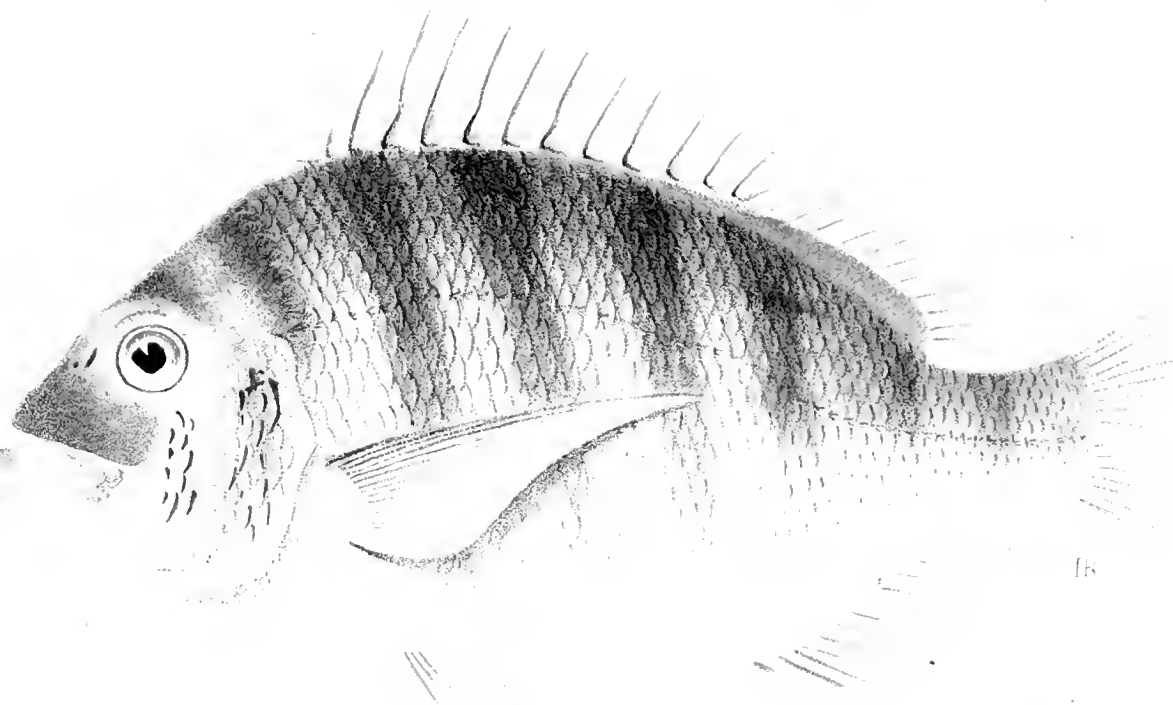
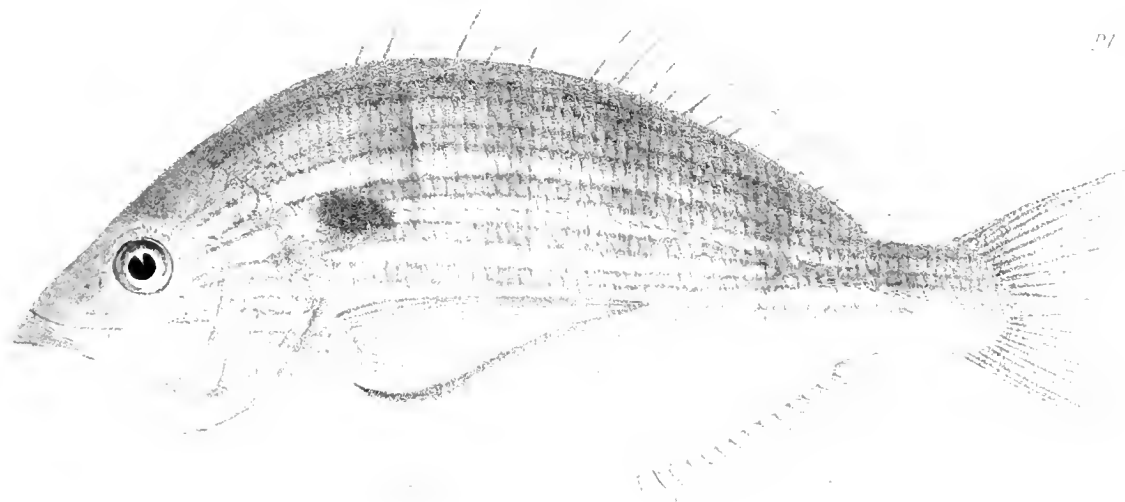
CHARACTERS. Jaws protractile; molar teeth in several rows, sub-conical, with rounded apices, and paved; incisor teeth broad, trenchant, and cleft at their cutting margins; branchial rays five.

LAGODON RHOMBOIDES. — *Linnaeus.*

Plate VIII. Fig. 1.

CHARACTERS. Head small; each jaw with eight incisor teeth, notched at their summits; body sub-oval, compressed, light gray above, silvery below; sides marked with eight longitudinal bands of purple, alternating with yellow; below the lateral line the bands are yellow, alternating with silver; a dark spot above the root of the pectoral fin. D. 12-11. P. 14. V. 1-5. A. 3-11. C. 17.

Pl 19



18

- SYNONYMES. *Sparus rhomboides*, *Lin.*, Syst. Nat., tom. i. p. 427.
Salt-water Bream, *Schoeffl*, Schrift. der Gesells. Nat. Freund., b. viii. p. 151.
Sparus rhomboides, *Shaw*, Gen. Zoöl., vol. iv. p. 447.
Sargus rhomboides, *Cur. et Val.*, Hist. Nat. Poiss., tom. vi. p. 68, pl. 143.
Sargus rhomboides, *DeKay*, Zoöl. N. Y., part iv. p. 93, pl. 71, fig. 228.
Sargus rhomboides, *Storer*, Synops., p. 81.
Salt-water Bream, *Vulgo*.

DESCRIPTION. This fish is of a semi-oval form, and compressed. The head is small, and uncovered with scales in front of the posterior part of the orbits. The eyes are large, and rather nearer the snout than the angle of the opercle, their lower margin corresponding with the median plane of the head. The posterior and larger nostril is an elliptical opening, directed downward and forward to about the middle plane of the eye; the anterior is round, and both are on a line within the orbit.

The mouth is small, and does not reach half the distance between the snout and orbit; the lips are thin; the upper jaw is the longer, and the lower is so received within it as to leave the teeth of the upper exposed. Both jaws are armed with eight incisor teeth, notched at their cutting margins; behind these are two rows of sub-conical molar teeth, rounded at their apices, so as to resemble paving-stones; scattered between these rows are very small teeth of similar form, which are collected in a group at the symphysis just within the incisors. The pharyngeal bones have numerous teeth, conical, pointed, and recurved.

The pre-opercle is round at its angle; the ascending border is not serrated, but has numerous longitudinal depressions, which give a beautiful, though minute, plaited appearance to the skin that covers it; it is without scales behind, but near its anterior margin are four or five series of large scales, that cover the checks, leaving only a small smooth space below the eye. The opercle is narrow in the antero-posterior direction, and terminates in an obtuse angle behind, above which it is slightly emarginate; it is covered with scales, as is also the inter-opercle, which is very broad. The supra-scapular scale is large, round behind, with radiat-

ing striæ, and from it begins a row of scales of similar form and striæ, though smaller, that ascends forward to meet a corresponding row of the opposite side.

The dorsal fin is single, and begins nearly on a line with the root of the pectoral; it has in front one small recumbent and twelve erect spines; the second, third, and fourth longest and slightly curved; the soft portion has eleven rays. The pectoral fin is long, narrow, delicate, terminates behind in a point, and has fourteen rays. The ventral begins at the anterior fourth of the pectoral, and terminates before the vent; it is very near its fellow, and has a long, pointed, narrow, supplementary scale in the axilla above; each has one spine and five soft rays. The anal begins nearly opposite the first ray of the soft dorsal, and ends with it, before the root of the caudal; it has three spines received in a groove; the first is short and delicate; it has eleven soft rays. The caudal is broad, and forked, though it appears deeply crescentic when distended; it has seventeen rays.

The scales are semi-orbicular in form, finely ciliated behind, and straight before, with twelve radiating striæ, which give it a scalloped appearance. The lateral line is concurrent with the outline of the back, to the posterior extremity of the dorsal, when it descends to the median plane; its scales are smaller than those of the body, sub-round, with radiating striæ before, and a tube near the middle, which bifurcates behind into much smaller tubes.

COLOUR. The head above is pale brown, with small golden spots; the lips are white; the sides of the head and opercles are marked with several alternate pale-blue and golden lines; the body above the lateral line is marked with similar pale-blue and golden lines, but more clouded, slightly arched, and concentric; below the lateral line these are horizontal and parallel nearly to the belly, where the blue lines disappear, and are replaced with alternate white and golden lines; the belly is white; there is a dusky spot above the root of the pectoral fin; the spinous portion of the dorsal fin is transparent, with an irregular, longitudinal yellow band near its middle, bordered with pale blue. In the soft part of the dorsal, the yellow band in the centre is more regular, with yellow blotches above, and with its

margin yellowish; the ventral is transparent, and white, except its two or three anterior rays, which are yellow; the anal spines are white, and a yellow longitudinal band passes through the middle of the fin, which is bordered with blue near the origin of its rays, and with paler blue on its external margin; the caudal is yellowish-brown; six or seven vertical dusky bars at times mark the sides, the anterior of which includes the dusky spot above the pectoral fin; but it must be remembered, that these bands are often so indistinct, as to be seen only in certain lights.

DIMENSIONS. The length between the opercle and tip of the tail is equal to three and a half heads; the elevation, to a head and a quarter without the dorsal fin, and to a head and a half with it; total length, ten inches.

SPLANCHOLOGY. The peritoneum is silvery, but with numerous small, dusky spots, that give the whole a dark colour; the liver is large and trilobate; the left lobe is irregularly three-sided, and extends nearly to the vent; the middle lobe is thick above, and joined to the left, without a distinct fissure, but does not extend more than half as far back; the right lobe is thick, and about half as long as the middle lobe; both right and left lobes project into the hypochondria. The gall-bladder is a long tube, reaching nearly to the vent, and is very slightly enlarged behind. The stomach is rather small, though long, sub-cylindrical, and pointed behind in the undistended state; when full, it fills much of the abdominal cavity; the pyloric portion begins at the posterior fourth, and is small, though rather long; there are four large cæcal appendages. The small intestine runs half way to the vent, then returns to the base of the pylorus, whence it is reflected, after one or two short convolutions, to end in the rectum. The spleen is very small, oblong, and flattened. The air-bladder is large, broad before, and narrow behind, where it terminates in two horns. There is no urinary bladder, though the kidney is tolerably thick.

HABITS. The *Salt-water Bream* is found in our waters at all seasons of the year, though it is most abundant in May and June. It feeds on various crustaceous animals, and on smaller fish.

GEOGRAPHICAL DISTRIBUTION. This fish abounds along the southern shores of the United States, from Cape Hatteras to Lake Pontchartrain, where it was observed by Lesueur; what may be its extreme northern limit is not yet well deter-

mined. Cuvier and Valenciennes suppose it common in the waters of New York, because they have received "numerous specimens" from that city; but Dr. DeKay declares that he has never seen it in that latitude.

GENERAL REMARKS. Linnæus published the first account of this fish, from notes and specimens sent him by Dr. Garden, of Charleston, who called it *Salt-water Bream*. Gmelin, Shaw, and Lacépède have only copied Linnæus, without alteration, and this seems to be all that was known of our animal, previous to the work of Cuvier and Valenciennes; for I cannot believe, with them, that the *Poki* or *Porgee* of Schoepff has any reference to this fish; as Schoepff expressly says, that the whole body of his *Porgee* is silver-colour, and without stripes or spots; and he furthermore remarks, that it might possibly be identical with the *Sparus argyrops* of Linnæus (which it really is), though he confesses he could not see the three anterior prolonged dorsal rays. This animal cannot be retained in the genus *Sargus*, where it has been placed by ichthyologists; nor yet even in the family Sparidæ, because it lacks its most distinctive character, "jaws not protractile"; nor can it be arranged with the Menidæ, though its jaws are protractile, for it has the broad incisor teeth of *Sargus*; — I have, therefore, established for it the genus *Lagodon*, to which must also be referred the *Sargus unimaculatus* of Cuvier and Valenciennes.

FAMILY SCOMBRIDÆ. — *Agassiz*.

CHARACTERS. Body more or less elongated, and in general fusiform; ventral fins thoracic or jugular; two dorsal fins contiguous or remote; anterior dorsal spinous, posterior with soft rays; with or without finlets behind the dorsal and anal fins; vertical fins without scales; opercle and pre-opercle without spines or serratures; scales cycloid and small; branchial rays seven.

REMARKS. Such are the characters of this family, as it now stands restricted

by Agassiz; and it will be seen by a reference to his work,* that he has removed from it many of the fishes which were formerly included among the Scombridæ of Cuvier; and yet this family is still one of the most extensive, comprising more than fifty genera, and more than three hundred known species.

These fishes are in general more gregarious, and much more roving in their habits, than the Percidæ or the Sciænidæ, as some of the species, according to Cuvier and Valenciennes, are common, not only to the Atlantic shores of Europe, Africa, and America, but to the more distant seas of Asia and New Holland. Perhaps, of all the different families of fish, this may be considered as the most useful to man, especially when we look to its many varieties, the excellent food they all afford, and the immense numbers that are taken from this apparently inexhaustible source.

GENUS TEMNODON. — *Cuvier*.

CHARACTERS. Body oblong, compressed; jaws each with a single row of separated, sharp-pointed, compressed, lancet-shaped teeth, upper jaw with an internal series of crowded, villiform teeth; vomerine and palatine teeth minute, villiform; tongue with similar small teeth near its root; anal fin preceded by two small spines; tail without a carina; branchial rays seven.

REMARKS. This genus of the family Scombridæ was first established by Cuvier, for the reception of a single species, the *Gasterosteus saltatrix* of Linnaeus.

* Rech. Poiss. Foss., tom. v. p. 16.

TEMNODON SALTATOR. — *Linnaeus*.*Plate IX. Fig. 2.*

SPECIFIC CHARACTERS. Body oblong, compressed, silvery, shaded with bluish-green above; a dusky spot at the root of the pectoral fin. D. 8-27. P. 16. V. 1-5. A. 2-28. C. 20.

- SYNONYMES. Skipjack, *Catesby*, Carolina, &c., vol. ii. p. 14, t. 14.
 Gasterosteus saltatrix, *Lin.*, Syst. Nat., tom. i. p. 491.
 Gasterosteus saltatrix, *Gmel.*, Ed. Syst. Nat., tom. i. pars iii. p. 1326.
 Pomatome skib, *Lacép.*, Hist. Nat. Poiss., tom. iv. p. 268.
 Gasterosteus saltatrix, *Shaw*, Gen. Zoöl., vol. iv. part ii. p. 609.
 Scomber plumbeus, *Mitch.*, Trans. Lit. and Phil. Soc. N. Y., vol. i. p. 424, pl. 4, fig. 1.
 Temnodon saltator, *Cur. et Val.*, Hist. Nat. Poiss., tom. ix. p. 225, pl. 260.
 Temnodon saltator, *Storer*, Report, &c., p. 57.
 Temnodon saltator, *DeKay*, Zoöl. N. Y., part iii. p. 130, pl. 26, fig. 81.
 Temnodon saltator, *Hebb et Berth.*, Hist. Nat. des Isles Canaries (Ichth. par *Val.*),
 p. 58, pl. 26, fig. 2.
 Temnodon saltator, *Storer*, Synops., p. 108.
 Skipjack, *Vulgo*.

DESCRIPTION. The form of this fish is oblong, compressed, thicker above, and almost sharp below. The head is rather large, thick, with the line of the profile slightly convex, and the snout rounded. The eyes are of moderate size, and placed about the anterior third of the head, and near its median plane; the pupil is dusky, and the iris golden. The nostrils are closely approximated, and about one third the distance between the orbit and the snout, on a plane above the orbit, and on a line within the supra-orbital ridge; the posterior is large and semi-lunar; the anterior is nearly round.

The mouth is large, and opens to the anterior border of the orbit; the lips are thick, and the upper is slightly protractile; the lower jaw is thick in the vertical

direction, and slightly longer than the upper; both are armed with a single row of straight, sharp-pointed, compressed, or lancet-shaped teeth, about twenty-four in the upper, and twenty in the lower jaw, which are slightly longer, and received within those of the upper; the upper jaw has, besides, an internal and less extensive row of smaller teeth. The vomer is furnished at its anterior part with a small, sub-triangular patch of minute pointed, villiform teeth; each palate-bone has a narrow, oblong group, directed outward and backward, of similar teeth. The tongue is small, narrow, rounded in front, tolerably free, and is smooth, except near its base, where there are two small groups of very minute teeth. The pharyngeal bones are all armed with numerous small, villiform teeth.

The pre-opercle is very thin, rounded at its angle, with its ascending border slightly emarginate, and directed upwards and backwards. The opercle terminates behind, in two flat and pointed processes, covered with skin, which projects beyond them, and gives a rounded form to its angle. The sub-opercle and the inter-opercle are both large, and appear sub-ciliated at their free margin; the cheeks, the opercle, and the pre-opercle are covered with scales, but the jaws and snout are smooth. The gill-openings are wide; there are seven branchial rays.

The anterior dorsal fin arises opposite the middle of the pectoral, and has eight delicate spines; the fourth is longest, the eighth very minute, and all are connected by a membrane, delicate, thin, and transparent, and are completely received in a groove when the fin is closed; the posterior dorsal is much elevated, and has twenty-seven rays; the first and second are longest, and all are united by a thin, transparent membrane, on which minute scales ascend for some distance. The pectoral is short, thick at its root, though it terminates rather pointedly behind; it has sixteen rays, with a triangular fold of scaly skin in the axilla above. The ventral is very short, and has one spine and five soft rays; it begins nearly at the posterior border of the root of the pectoral, is very close to its fellow, and is bound by a fold of skin, for half its length, to the belly. The anal is shaped like the soft dorsal fin, and terminates behind it; it has twenty-eight soft rays, and is preceded by two minute spines, which are at times covered with skin. The caudal is thick

at its root, deeply forked, has twenty rays, and is covered with minute scales for three fourths of its length.

The scales are small, sub-pentagonal, with two sides directed forwards; the lateral line begins above the opercle, and is at first arched upwards, but it soon takes a straight course, and thus continues to the tail.

COLOUR. When first taken from the water, the Skipjack is of a brilliant silver-colour; but it soon becomes shaded with pale green along the back, which finally darkens into a greenish-blue, especially in the old fish, and hence it is called *Blue-fish* in some parts of the country, and *Green-fish* in others. The connecting membrane of the dorsal spines is perfectly transparent; that of the soft dorsal is semi-transparent, and slightly tinted with yellowish-green below; the pectoral fin is yellowish, transparent in its middle, with a few minute dusky spots at its tip, and has a bluish-black blotch at its base, which is most distinct on its inner face; the anal is yellowish, with a slight tint of olive, and a few minute dusky freckles; the caudal is yellowish-olive, with dusky points to near its tip, which is yellowish.

DIMENSIONS. The length from the opercle to the tip of the tail is equal to three heads and one eighth; the greatest elevation is about seven eighths of a head; total length, three feet.

SPLANCHNOLOGY. The liver is large and trilobate, as the central portion is prolonged backwards, nearly as far as the right lobe, and is its thickest part; the right and left lobes are both long and slender, the former shorter and narrower. The cœcal appendages are delicate, and extremely numerous. The gall-bladder is an elongated tube, nearly of the same size throughout, with several convolutions, and closed at its posterior extremity, which is near the vent. The stomach is large, sub-cylindrical, with very thick walls, and extends three fourths the length of the abdomen; its pyloric branch is small, very short, goes off from the stomach at its anterior fifth, and has a well-marked pyloric contraction. The spleen is dark purple, slender, and very long, as it extends from the right lobe of the liver to near the vent. The ovaries are small, oblong, and unite in substance far back. The kidney is large near the œsophagus, narrow and thick in the middle, and pointed behind; there is no urinary bladder. The air-bladder is simple, and has exceedingly thin walls.

HABITS. These fishes have many of the habits of the common Mackerel; they collect in great multitudes, and often swim near the surface of the water, and thus cause a thousand ripples; and at times they leap a foot or more into the air, whence the common name *Skipjack*; they are ravenous, and seize the hook greedily, when baited with small living fish, or if it be kept in motion, or dragged behind a boat under easy sail. Their flesh is not much esteemed at the South, where they are generally small; but at the North they reach a much larger size, and are there highly prized.

GEOGRAPHICAL DESCRIPTION. The *Skipjack* has the widest geographical distribution; it is found on the Atlantic coast of America, from Massachusetts Bay, according to Storer, to Brazil, where it was observed by the Prince de Wied; Webb and Berthollet saw it at the Canary Islands; and Cuvier asserts that it not only inhabits the Mediterranean Sea and the Atlantic Ocean, but is also found along the shores of Madagascar, Amboyna, and New Holland.

GENERAL REMARKS. Catesby, in his Natural History of Carolina, &c., gave the first account of this fish, and accompanied it with a figure; the description is short and imperfect, and the figure is very defective, as it represents the animal wanting the anterior dorsal fin, which is, in fact, so small, thin, and delicate, and so completely received in a groove when the fin is closed, that it might easily be overlooked by a careless observer.

Linnaeus's description is next in order, and is very good, as it was drawn from recent specimens sent him by Dr. Garden.

Lacépède described it at first as the *Pomatome skib*, from drawings done in Carolina, by Bosc; and again, according to Cuvier and Valenciennes, as the *Cheilodiptère heptacanth*, from a drawing of Commerson, made at Madagascar; though Lacépède says his fish is an inhabitant of the "*grand océan équatorial*."

Gmelin and Shaw have done no more than retain the name, and copy the description, of Linnæus.

Dr. Mitchill observed this fish in the waters of New York, and, supposing it to be an undescribed species of *Scomber*, he applied to it the specific name of *plumbeus*, and gave a very good figure of it.

Cuvier and Valenciennes have published the most accurate description of the *Skipjack*, and cleared up the obscurity of its history.

GENUS CYBIUM. — *Cuvier*.

CHARACTERS. Body elongated, without a corselet ; maxillary teeth rather large, sharp, more or less compressed ; vomerine and palatine teeth villiform, short, equal ; finlets behind the dorsal and anal fins ; a carina on each side the tail ; branchial rays seven.

CYBIUM MACULATUM. — *Mitchill*.

Plate IX. fig 1.

SPECIFIC CHARACTERS. Body sub-cylindrical, elongated ; above silvery, clouded with bluish-green ; jaws, opercle, sides, and belly satin-white, with occasional purple tints ; several bright cupreous spots, both above and below the lateral line, which terminates in a strong carina ; eight finlets each to the dorsal and anal fins. D. 18 - 1 - 15 = 8. P. 19. V. 1 - 5. A. 2 - 15 = 8. C. 22.

SYNONYMES. *Scomber maculatus*, *Mitch.*, Trans. Lit. and Phil. Soc. N. Y., vol. i. p. 426, pl. 6, fig. 8.

Cybium maculatum, *Cuv. et Val.*, Hist. Nat. Poiss., tom. viii. p. 181.

Cybiium maculatum, *Storer*, Bost. Jour. Nat. Hist., vol. iv. p. 179.

Cybiium maculatum, *DeKay*, Zoöl. N. Y., part iii. p. 108, pl. 73, fig. 232.

Cybiium maculatum, *Storer*, Synops., p. 92.

Spanish Mackerel, *Vulgo*.

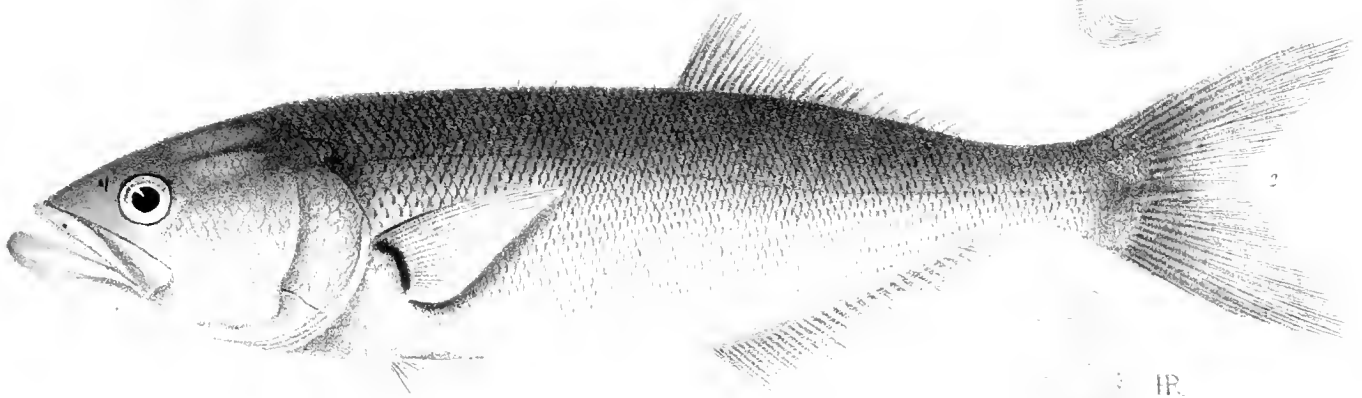
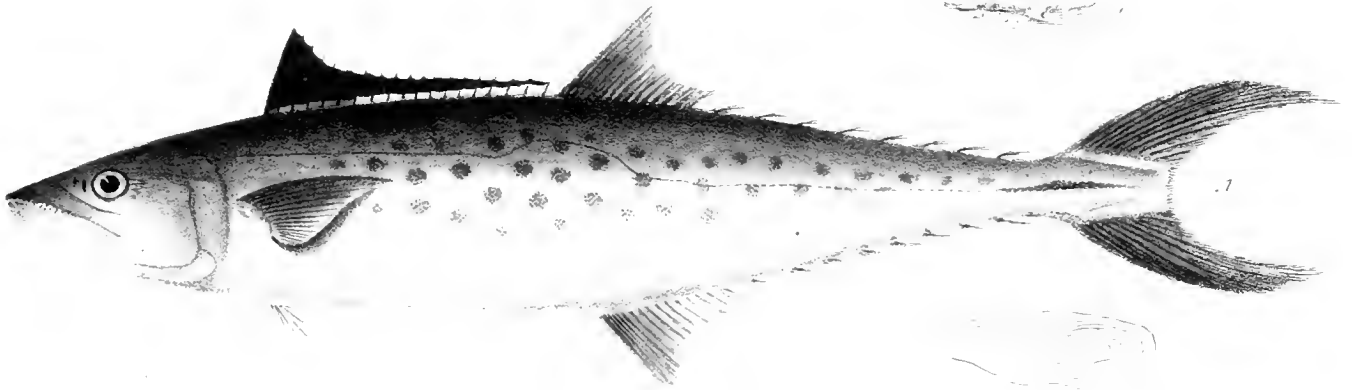
DESCRIPTION. This is a beautiful fish, with somewhat the form of the Mackerel; the body is, however, more elongated, slender, and compressed both above and below, so that a transverse section of it appears semi-oval; it is smooth and without scales, except near the base of the dorsal fin. The head is long, compressed, the outline above nearly straight. The snout is prolonged, narrow, and terminates in a point, which is slightly incurved in front; the lower jaw is equally long, and very thick in the vertical direction. The posterior nostril is large, oval, narrow, vertical, very near the orbit, and on a plane with its middle; the anterior is sub-oval, situated at a distance from the posterior, and on a plane with the upper margin of the eye. The eye is of moderate size, and placed about midway between the snout and posterior border of the opercle, above the median plane of the head, and near the facial line; the pupil is dusky, and the iris a pale golden colour.

The mouth is large, extending beyond the middle of the orbit of the eye; both jaws are armed with a single row of strong, elongated, conical teeth, very pointed, and slightly compressed, which gives them a sub-lanceolate form; there are about eighteen in each jaw, and nearly of the same size; the upper may be a little larger, but the lower are quite as long; they are all directed obliquely forward; those of the lower jaw are received within those of the upper, and decussate them when the mouth is closed. The whole surface of the roof of the mouth is studded with minute teeth, scarcely visible, but very perceptible to the touch; besides these, there is a small group of larger teeth on the anterior part of the vomer, and a narrow oblong group of teeth of similar size, extending backwards on each side of the palate. The tongue is short, slightly movable, pointed at the tip, broad behind, and roughened with innumerable minute teeth. The pharyngeal bones are small, long, narrow, and thickly studded with small, sharp teeth, curved backwards at their point.

The pre-opercle is incurved at its ascending border, and smooth. The opercle is rounded, smooth, flat, and slightly projecting at its angle. The gill-openings are large; there are seven branchial rays.

The anterior dorsal fin is rather low, and has eighteen spinous rays; the first is longest, and the posterior very short, almost concealed in the anterior root of the second dorsal; these are received in a groove when the fin is closed. The second dorsal is elevated in front, but soon becomes depressed, and in this way terminates; it has one spinous and fifteen soft rays, the anterior stout and strong, like a concealed spine; the second, third, and fourth are longest. Behind this fin are eight small finlets, round at their roots, but compressed and broad above; the last portion of the dorsal appears like a finlet, but is not perfectly separated. The pectoral arises close to the opercle, and is rather long and narrow, though broad at its root; it is sub-falciform, and terminates in a point about the tenth dorsal spine; it has eighteen rays; and the axilla is deepened by a portion of skin adhering to the fin and to the belly. The ventrals are very small, short, and close together; they begin on a line with the posterior margin of the root of the pectorals, and terminate about their posterior third; their internal margins are connected by a fold of skin to the belly, and each has one spinous and five soft rays. The anal fin has two spinous and fifteen soft rays, and is falciform; it begins opposite the third dorsal ray, and terminates beyond its ninth; there are eight finlets behind it. The caudal is bi-lobed; each lobe is long, slender, and pointed; there are twenty-two rays.

The lateral line is slightly undulated, though concurrent at first with the outline of the back; it runs nearly along the upper third of the body, to the anterior part of the second dorsal, when it suddenly curves down to the median plane, and thus is continued with slight flexures to the tail, where it terminates in a crest or carina, which appears large and sub-triangular if seen from above, as its elevation is one fourth of its length. Both above and below this crest is another, less prominent, though nearly as long; these begin on a line vertical with the middle of the first, and run along the roots of the lobes of the caudal fin.



COLOUR. This is a beautiful animal, with a bluish-green tint along the upper part of the head and back, above the lateral line, and a white, satin-like appearance below it; the sides, both above and below the lateral line, are ornamented with numerous sub-round, shining, cupreous spots; the anterior dorsal is black, with a narrow longitudinal line of white at its base; the pectoral is semi-transparent, with a dusky shade at its root; the ventral is white, with a yellow tint in front; the second dorsal and anal fins are yellowish, with dusky lines; the caudal is dusky, with yellowish tints.

DIMENSIONS. The head is one sixth of the total length; the elevation of the body without the dorsal fin is less than a head; total length of the specimen here described, twenty-two inches; they are occasionally taken more than two feet in length.

SPLANCHNOLOGY. The liver is of moderate size; its central portion is thick and prolonged, to form a middle lobe. The gall-bladder is oblong and narrow, but does not pass beyond the right lobe, to which it is attached. The stomach is long, narrow, and reaches three fourths of the extent of the abdomen; its walls are of moderate thickness; its pyloric portion is very small, short, narrow, and departs from the stomach at an acute angle; the small intestine runs nearly to the vent, then makes a short convolution, and returns to end in the rectum.

HABITS. But little is known of the habits of this fish; it seems, however, more solitary than the fishes of its family generally are, as it seldom happens that more than four or five are taken at the same time. It appears on the coast of Carolina in April and May, but is rarely seen during the summer months; it feeds on various species of small fish.

GEOGRAPHICAL DISTRIBUTION. The *Cybiium maculatum* is found on the Atlantic shores of America, from Brazil to Massachusetts. Cuvier received specimens from South America, and Dr. Storer from the waters near Boston.

GENERAL REMARKS. Dr. Mitchill gave the first account of this fish, and called it by the appropriate specific name it still bears.

GENUS SERIOLA. — *Cuvier*.

CHARACTERS. Body elongated, fusiform, sub-compressed: first dorsal fin with a continuous membrane; no finlets; lateral line with scales not larger than those on the rest of the body; branchial rays seven.

SERIOLA CAROLINENSIS. — *Holbrook*.

Plate X. fig. 2.

SPECIFIC CHARACTERS. Head olive-brown above, with a dark band from each orbit to the anterior dorsal; body above bluish-slate colour; sides yellow; belly white; a yellow band from the opercle to the tail; a dimple above and below the root of the caudal fin. D. 7-1-36. P. 18. V. 1-5. A. 2-1-22. C. 20.

SYNONYME. Jack-fish, *Vulgo*.

DESCRIPTION. This fish is of an elongated, slightly compressed, sub-fusiform shape; it is thin along the back, and almost carinated in front of the dorsal fin, thicker and rounded along the belly, though thickest just below the lateral line. The head is large, long, and very broad between the eyes, with orbits rather projecting; the snout is narrow, though rounded. The eye is large, rather longest horizontally, with its posterior border nearer the snout than the angle of the opercle, and with its inferior margin above the median plane of the head; the pupil is nearly circular, and deep blue, with a golden iris, covered behind with a nictitating membrane. The nostrils are midway between the eye and the snout; they are elliptical in form, closely approximated, and nearly of the same size; the anterior is rather the lower, though both are above the median plane of the eye, and on a line within the margin of the orbit.

The mouth is large, the posterior extremity of the upper jaw reaching to the middle of the orbit; the lips are tolerably thick. The upper jaw is protractile, and appears shorter than the lower when the mouth is open, but when shut, they are of the same length; both are armed with a large group, which is broadest in front, of numerous small, pointed, card-like teeth; there is an arrow-headed group on the vomer, and an oblong patch of minute teeth on each palate-bone. The tongue is broad, thick, rounded in front, and tolerably free, with its superior surface armed with an oblong group of minute teeth along its centre. The pharyngeal bones are furnished with teeth similar to those of the jaws, but smaller. The pre-opercle is nearly semicircular, and slightly prolonged at its angle. The opercle is irregularly quadrilateral, with its anterior inferior angle prolonged and truncated, to articulate with the inter-opercle. The sub-opercle is elongated, triangular, with its base downwards, to unite with the concave margin of the inter-opercle, which is broad. There are seven rather stout branchial rays.

There are two dorsal fins; the anterior begins nearly opposite the anterior third of the pectoral, and is preceded by a short, recumbent spine, directed forwards; it has seven spines, the sixth and seventh being very short, and all are placed in a groove. The posterior dorsal is long, as it terminates only at the root of the caudal, and has one spinous and thirty-six soft rays, of which the third, fourth, and fifth are the longest. The pectoral fin is short and broad, though pointed behind; it begins behind the opercle, and has eighteen rays. The ventral is large, and arises with the pectoral, though it extends farther back; it has one spine and five soft rays, of which the first and last are so joined to the body as to make a deep cavity. The anal is in shape like the soft dorsal fin, and though shorter is co-terminal with it behind; it has one spinous and twenty soft rays, and is preceded by two small spines, which are often concealed by the skin. The caudal is widely forked, though at the junction of the forks it is crescentic; it has twenty rays.

The scales are minute, and mostly covered by the skin. The lateral line is at first concurrent with the outline of the back, and runs along the superior third of the body; but at the beginning of the second dorsal it gradually descends to the

median plane, and thus continues to the tail, where it is raised on a slightly elevated carina, though the scales are not larger there than in other parts of the body.

COLOUR. The head above is olive-brown, and from each orbit runs backward a broad black band, to meet at an acute angle in front of the dorsal fin; the lower jaw, the pre-opercle, and opercle are silvery, tinted yellow; the back is bluish slate-colour; the sides are golden, and the belly white; there is a broad yellow band extending from the opercle to the root of the caudal fin; the pectoral is transparent, of a yellowish tint in front, and white behind; the rays of the ventral fin are white below, but above they have a bluish shade, though the membrane is everywhere transparent; the anal is semi-transparent, clouded with blue, and having a strong yellow tint in front; the tips of the two or three anterior rays are white; the caudal is olive-brown, with yellowish tints, especially near its tip.

DIMENSIONS. The entire length, from the opercle to the tip of the tail, is equal to three heads and one fourth; the greatest elevation is seven eighths of the head; total length, two feet four inches.

SPLANCHNOLOGY. The liver is large, consisting of two lobes, and a middle or transverse portion; yet these divisions are only seen on its dorsal face; the lobes are nearly of the same size, but the left is rather longer, and pointed at its posterior extremity, while the right is broader and lobulated, and both send pointed lobules forward; the central portion is thick, with a thin posterior margin, irregular, and often subdivided into short, small lobules. The gall-bladder is long, slender, and only slightly increased in size, near the right lobe of the liver, in which it is partially imbedded. The stomach is cylindrical, pointed behind, with thick walls, and is very long, extending to the posterior fourth of the abdominal cavity. The pyloric portion is very short, not half an inch long, but very thick and firm; it begins near the anterior fourth of the stomach, and has a remarkable pyloric contraction. The small intestine runs to the posterior fourth of the abdomen, when it makes a short convolution forward, and then returns to end in the rectum; its walls are very thick, hard, and firm, with its mucous coat minutely reticulated; the rectal valve is very small. The cœcal appendages are very numerous, ranging from forty to fifty in number; but all do not come directly from the intestine, as one root is subdivided into several branches. The spleen is rather thick and long, though it is concealed, in a great measure, by the small intestine. The air-bladder is conical, large, and long, as it extends the whole length



of the abdominal cavity ; its apex is behind and pointed, its basis is before and has a minute horn on each side, directed forwards and outwards ; these horns are so small as to resemble, at first sight, ligamentous bands ; yet examination shows them to be pervious.

HABITS. The *Seriola Carolinensis* lives in deep water, and is taken along the coast of South Carolina at all seasons of the year, but is never abundant.

GEOGRAPHICAL DISTRIBUTION. As yet, this fish has only been observed in the waters of our State.

GENERAL REMARKS. At first, I supposed the *Jack-fish* might be the *Seriola Boscii* of Cuvier and Valenciennes ; but it does not agree with their description, in many particulars, as in its colour, in the number of its dorsal fin rays, or in size.

SERIOLA ZONATA. — *Mitchill*.

Plate X. Fig. 1.

SPECIFIC CHARACTERS. Body above pale bluish slate-colour ; belly silvery ; sides with vertical dusky bands, indistinct below the lateral line ; three anterior dorsal rays, white at their tips ; a dimple above and below the root of the caudal fin. D. 7 - 1 - 34. P. 19. V. 1 - 5. A. 2 - 19. C. 19.

SYNONYMES. *Scomber zonatus*, *Mitch.*, Trans. Lit. and Phil. Soc. N. Y., vol. i. p. 427, pl. 4, fig. 3.
Seriola zonata, *Cuv. et Val.*, Hist. Nat. Poiss., tom. ix. p. 213.
Seriola zonata, *DeKay*, Zoöl. N. Y., part iii. p. 128, pl. 9, fig. 26.
Seriola zonata, *Storer*, Synops., p. 105.
 Banded Mackerel, *Vulgo*.

DESCRIPTION. The form of this fish is elongated, sub-fusiform, slightly compressed, and moderately curved along the back, where it is thin, and even carinated in front of the dorsal fin ; it is straighter and thicker at the belly, though

the thickest part is just below the lateral line. The head is large, broad between the eyes, and the snout is rounded, though narrow. The eyes are of moderate size, and placed nearer to the snout than to the posterior border of the opercle; the pupil is of the deepest blue, and nearly circular, only a little angular in front; the iris is light silvery-grey, with golden tints along its superior half. The nostrils are closely approximated, and midway between the eye and snout; they are sub-elliptical in shape, nearly of the same size, rather above the middle plane of the eye, and on a line within the orbit.

The mouth is rather large, as the superior maxillary bone extends nearly to the middle of the orbit; the lips are thin; the upper jaw is slightly protractile, rather longer than the lower, and both are armed with numerous small, pointed, card-like teeth. There is an irregular, arrow-headed patch on the vomer; and an oblong group of minute teeth on each palate-bone. The tongue is broad, thin, white, and rough, with minute teeth. The pre-opercle is large, thin, rounded, and rather prolonged at its angle, with several slight, radiating depressions. The opercle is irregularly quadrilateral, slightly notched at its posterior border, and with its anterior inferior angle prolonged and pointed. The sub-opercle is long, narrow, triangular, with its base below. The inter-opercle is rounded at its base. The gill-openings are large; there are seven branchial rays.

There are two dorsal fins; the anterior begins behind the root of the pectoral, and is preceded by a short recumbent spine; it is but slightly elevated, and has seven spines, of which the third and fourth are longest, and all are perfectly concealed in a groove when the fin is closed; the posterior dorsal is very long, extending nearly to the root of the caudal fin, and has one spinous and thirty-four soft rays, the anterior longest. The pectoral fin is short; it begins just behind the opercle, and terminates on a line with the middle of the ventral; it has nineteen rays. The ventral is large, broad, and has one spinous and five soft rays; the internal being connected, for some distance, to the body, by a fold of skin. The anal is long; it begins about the middle of the soft dorsal, and is coterminous with it behind; it has one spinous and nineteen soft rays, and is

preceded by two minute spines. The caudal is broadly forked, and is preceded by a dimple, both above and below ; it has nineteen rays.

The scales are minute. The lateral line runs at first, with very slight undulations, near the superior fourth of the body, and is concurrent with the outline of the back ; but at the second dorsal it gradually descends to the median plane, and at the extremity of the dorsal it is slightly elevated into a carina.

COLOUR. The head above is dusky, with an olive tint ; below the eyes it is silvery, with yellowish-brown shades ; from each orbit runs upwards and backwards a broad dusky band, to meet in front of the dorsal fin ; the body, above the lateral line, is a very pale bluish slate-colour, and on each side it is marked with vertical, dusky bands ; these are most remarkable above the lateral line, indistinct below it, and are, in fact, not seen at all when the fish is just taken from the water ; the anterior band runs to the root of the pectoral fin, but seldom below it ; the second is longer, and touches the posterior extremity of the pectoral fin ; the third is between the ventral and anal fins, and is most distinct of all at the belly ; the fourth is at the origin of the anal fin, and the fifth about its middle ; and besides these bands, there is a dusky blotch at the root of the caudal. A yellow, horizontal band extends from the opercle to the tail, and a second band of similar colour, but less distinct, is often found below it.

The anterior dorsal is bluish, dusky, interspersed with lighter tints, and is light-coloured at its base ; the posterior dorsal is semi-transparent, dusky-bluish, with lighter tints, especially near its superior border, and the three first rays have their tips white ; the pectoral is transparent, with the slightest yellow tint, and a dusky blotch on the inner face, at its origin ; the anal is dusky-olive, with a yellowish tint at its anterior part, and with its lower margin white ; the rays of the ventral fin are white, but the membrane uniting them is bluish below, and yellowish-brown above ; the caudal is yellowish-olive, darkest near its root.

DIMENSIONS. The entire length, from the opercle to the tip of the caudal fin, is equal to three heads and one sixteenth; the elevation, without the dorsal fin, is equal to one head; total length, fourteen inches.

SPLANCHNOLOGY. The liver has two lobes, and a transverse portion; yet they are so joined on their ventral face, as to show scarcely any mark of separation, unless the viscus be removed from them; both lobes are short, but the right is rather the longer, and has its posterior border thin and irregular, or even divided into small lobuli, where it conceals the cœcal appendages; both send forward pointed lobes to the hypochondria; the gall-bladder is placed mostly behind the right lobe, and is long and slender. The stomach is elongated, cylindrical, and extends nearly to the vent; it has tolerably thick walls, with numerous folds on its inner face; the pyloric portion goes off near the diaphragm, and is very short. The small intestine runs two thirds the length of the stomach, and is then reflected to the pylorus, whence it returns to end in the rectum; it has very firm and thick walls, and its mucous membrane is finely reticulated; the rectal valve is circular, and very prominent. The cœcal appendages are numerous, clustered together, and bound about the pylorus; they are all very slender, though they vary in length, some of them being an inch and a half long. The air-bladder is long, extending the entire length of the abdomen; it is pointed behind, truncated, and broad before, with a minute short horn on each side, that runs upward and outward, and appears at first like a ligamentous band, but it is pervious; its walls are very thin.

HABITS. This fish is so rarely seen on our coast, that nothing can be said of its habits.

GEOGRAPHICAL DISTRIBUTION. The *Banded Mackerel* inhabits the Atlantic coast of America, from New York to Georgia; and what may be its farther limit north or south remains to be determined.

GENERAL REMARKS. Dr. Mitchill first observed this animal, and described it as a new species of *Scomber*, with the appropriate specific name *zonatus*, which has been very justly retained by succeeding naturalists.

SERIOLA COSMOPOLITA. — *Cuv. et Val.**Plate XI. Fig. 1.*

SPECIFIC CHARACTERS. Body compressed; back slightly and belly much arched; pale green above, silvery-white below, with pinkish-coloured reflections; a dark spot at the opercle, and another above the root of the caudal fin. D. 8-1-27. P. 18. V. 1-5. A. 2-1-27. C. 17.

SYNONYMES. *Seriola cosmopolita*, *Cuv. et Val.*, Hist. Nat. Poiss., tom. ix. p. 219, pl. 259.

Seriola cosmopolita, *DeKay*, Zool. N. Y., part iv. p. 129.

Seriola cosmopolita, *Storer*, Synops., p. 106.

Green Mackerel, *Vulgo*.

DESCRIPTION. This fish belongs to the section of the genus *Seriola* with very short ventral fins, long, slender, falciform pectorals, and a compressed body. Its form without the tail is elliptical, with the lower line of the ellipse most arched, though both the lines of the back and belly meet at the snout under the same angle; the body is thin along the back, and almost carinate at the belly; its thickest part is just below the lateral line, so that a transverse section appears as a narrow ellipse, broadest above. The head is short, elevated, uncovered with scales, and the snout narrow, though rounded.

The eye is very large, and is placed midway between the posterior angle of the opercle and the tip of the lower jaw, and is just its diameter from each, with its lower margin above the median plane of the head. The pupil is dark, the iris golden, intermixed with green, and has its posterior margin covered with a thin, nictitating membrane, which, however, does not encroach upon the pupil. The nostrils are midway between the eye and snout; the posterior is large and oval; the anterior is a narrow fissure, and both are near the facial outline, and on a line

within the orbit. The mouth is small, compressed, opens obliquely downwards and backwards, and ascends above the lower margin of the eye; the upper jaw is very protractile; the lower is thick in the vertical direction, and longer than the upper, so as to make part of the facial outline when the mouth is closed; and both are armed with minute, card-like, and pointed teeth; the vomer has a small patch in front, and the palate-bones have a narrow group of similar asperities; the tongue is slightly roughened along its central portion; the pharyngeal bones are closely covered with minute teeth, similar to those in the jaws, but smaller.

The pre-opercle is round, and rather prolonged at its angle, with the skin beautifully arranged in minute plaits or folds. The opercle is sub-rhomboidal, with its anterior inferior angle prolonged and pointed, and its posterior border so emarginate as to form two flattened points, from which the skin hangs. The sub-opercle is an isosceles triangle, with its base below; the inter-opercle is rounded and broad, and does not join the opercle. The gill-openings are large; there are seven branchial rays.

There are two dorsal fins; the anterior is preceded by a minute recumbent spine, and has eight erect spines, the first and last short, the third and fourth longest; it is completely received in a groove. The posterior dorsal is very long, low, and has one spinous and twenty-seven soft rays, covered with a delicate skin at their roots. The pectoral is falciform, slender, and very long, as it begins at the opercle, and terminates with the origin of the tenth dorsal soft ray; it has eighteen rays. The ventrals are very short, near together, and placed in a depression, as is also the vent; each ventral has one spinous and five soft rays. The anal is preceded by two prominent spines, placed in a groove, and connected by a delicate membrane; it is almost as long as the soft dorsal, with which it terminates behind; it has one spinous and twenty-seven soft rays. The caudal is broad, widely forked, and has seventeen rays.

The scales are minute, and mostly concealed by the skin. The lateral line is arched, and concurrent with the outline of the back in its anterior half, with slight

undulations in its course; but at the sixth dorsal soft ray it descends to the median plane, and then runs straight to the tail, where it is slightly elevated.

COLOUR. This is a beautiful fish; when first taken from the water, the superior half of the whole animal, except the dorsal fin, is of palest green; the inferior half is silvery, shining, iridescent, or with purple reflections; but soon it assumes a brassy tint above, and a pale golden tint below. The first dorsal fin is transparent, its anterior half shaded yellow, and clouded with minute dusky points; the posterior dorsal is transparent along its root, within the wall of scales above mentioned, and beyond this the three anterior fourths are clouded by numerous black points, but its whole margin has a yellowish tint; the pectoral is perfectly transparent, with a faint yellow tint, and a dusky spot, more or less distinct, on the inner face at its root; the ventral is white; the spines preceding the anal fin, as well as the membrane that unites them, are white; the anal is transparent at its origin, with the three or four anterior rays yellowish, with a few minute dusky spots; the rest is yellowish, most distinct near the margin; the caudal is dusky-olive at its root, and yellowish towards its extremity; there is a large black spot at the base of the upper fork of the caudal fin.

DIMENSIONS. The length between the opercle and tip of the tail is equal to four heads; the greatest elevation, with the dorsal fin, is equal to two heads, and to one head and two thirds without it; total length, ten inches.

SPLANCHNOLOGY. The peritoneum is of a silvery colour. The liver is but one mass, with a depression in front and above for the œsophagus, and small, short lobuli on each side of it; though there is no distinct appearance of lobes below, yet the portion on the right side does not reach more than half as far back as that on the left, and has an irregular margin, while the latter terminates in a point; but the central portion is largest, and thickest; it extends nearly to the vent, and then ends in a small pointed lobule, that projects forward. The gall-bladder is rather large, sub-conical, elongated, and situated almost entirely behind the right side of the liver. The stomach is of moderate size, with tolerably thick walls, and numerous longitudinal folds of its mucous membrane, which are not, however, permanent; the pyloric portion springs from its posterior extremity, which turns forward, and is nearly as long as the stomach itself, and has much firmer walls, with a well-marked

pyloric contraction. The intestine runs nearly to the anus, whence it is reflected to the diaphragm, and then returns to end in the rectum, with a small rectal valve. There are fifteen long, slender cæcal appendages. The spleen is sub-pyramidal, three-sided, and is placed far back on the right side. The air-bladder is large and long, as it extends beyond the abdominal cavity ; its walls are thin ; it is small and pointed before, but has two small horns behind. The kidney is large in front, and has a long, slender ureter.

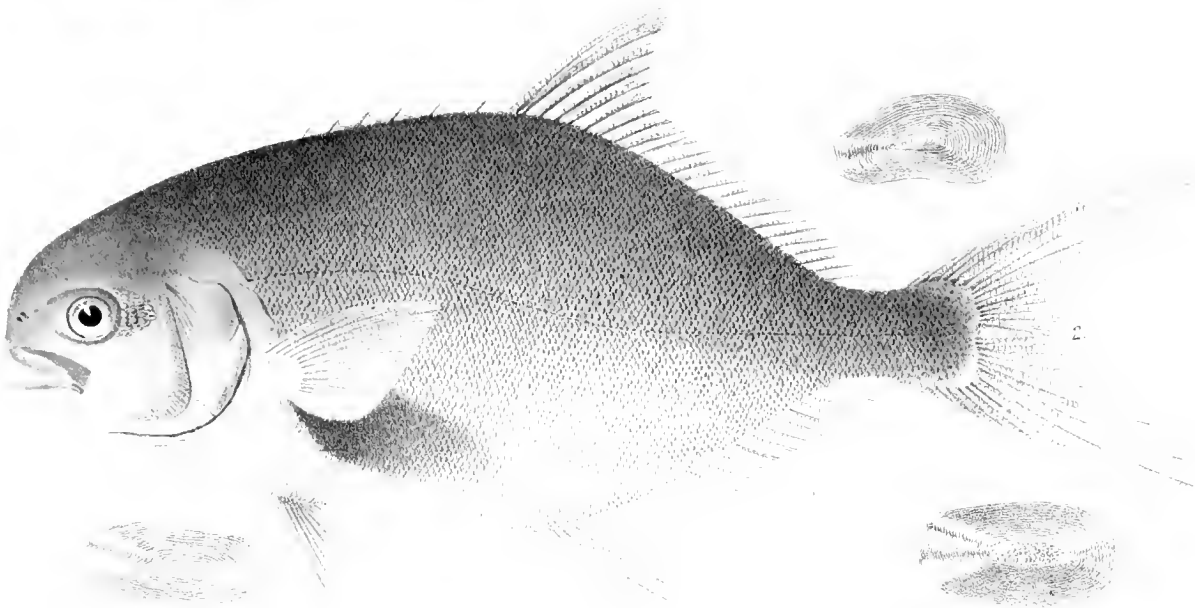
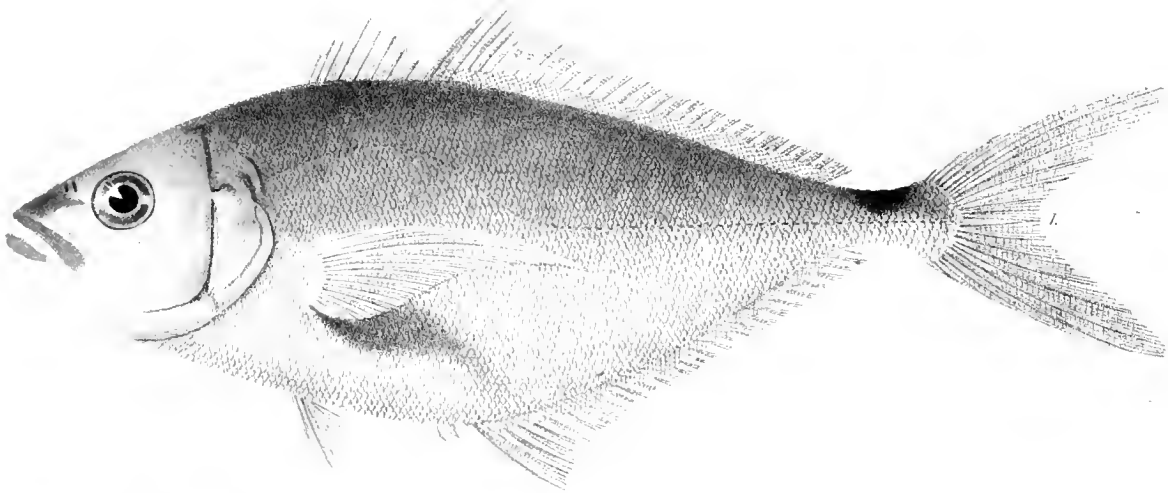
HABITS. The *Seriola cosmopolita* is so great a stranger to Carolina, that not much can be said of its habits. It visits our shores during the hottest season of the year, in the months of July and August, but only occasionally, and often at the interval of two or three years ; it is never abundant, as seldom more than half a dozen are taken in a summer, and always in very deep water, and at a distance from the shore. Parts of small fish are generally found in the stomach.

GEOGRAPHICAL DISTRIBUTION. According to Cuvier and Valenciennes, this animal has the widest geographical range, it being common to the Atlantic and Pacific Oceans, and hence the specific name *cosmopolita*. They furthermore observe, that "they have received it from Brazil and New York" ; yet it is not mentioned by Dr. Mitchill, in his Fishes of New York ; nor does Dr. DeKay, who is later and much better authority, consider it as an inhabitant of that State.

GENUS BOTHROLÆMUS.* — *Holbrook*.

CHARACTERS. Neither maxillary, inter-maxillary, palatine, nor vomerine teeth ; pharyngeal bones large and massive, with numerous pits, like sockets, but without teeth ; body elevated, compressed ; neither carina nor crest at the tail ; dorsal and anal fins with three or four of their anterior rays prolonged, and preceded by free spines ; branchial rays seven.

* From *βόθρος*, *fovea*, and *λαιμός*, *gula*.



REMARKS. This genus is closely allied to *Lichia* and to *Trachinotus*, but it may be known from either by the absence of teeth.

BOTHROLÆMUS PAMPANUS. — *Cuv. et Val.*

Plate XI. Fig. 2.

SPECIFIC CHARACTERS. Body elevated, compressed; anterior dorsal represented by six short spines, each with a short membrane, and preceded by a recumbent spine directed forward; posterior dorsal and anal fins with their anterior rays prolonged; the facial outline descends abruptly before the eyes; colour golden, shaded with pale blue along the back. D. 6-1-24. P. 16. V. 1-5. A. 2-1-21. C. 20.

SYNONYMES. *Trachinotus pampanus*, *Cuv. et Val.*, Hist. Nat. Poiss., tom. viii. p. 415, pl. 237.
Lichia Carolina, *DeKay*, Zoöl. N. Y., part iv. p. 114, pl. 10, fig. 30.
Trachinotus pampanus, *Storer*, Synops., p. 99.
Lichia Carolina, *Storer*, Synops., p. 96.
 Cavalli, or Crevallé, *Vulgo*.

DESCRIPTION. The head is elevated and slightly carinated above, though broad between the eyes; the facial outline descends in a regular curve to the level of the nostrils, when it is suddenly incurved to the inter-maxillary bone, which gives a truncated appearance to the snout. The eye is very large, and about the median plane of the head; it is one diameter of the orbit from the snout, and two diameters from the posterior margin of the bony opercle. The nostrils are large, closely approximated, nearly of the same size, and about midway between the orbit and snout; the posterior is rather the larger, and is semilunar in form; the anterior is semi-oval, and both are above the median plane of the eye, and on a line within the orbit.

The mouth is small ; the lips are tolerably thick and fleshy ; the jaws are without teeth ; the tongue is large, thick, and smooth. The pharyngeal bones are very remarkable ; the inferior, as well as the central superior, are very strong, massive, and heavy, and have their grinding surfaces marked with numerous pits and depressions, like sockets for teeth, which are never found either in the young or in the adult animal ; but in the small posterior pharyngeals, very frequently a few pointed, small, card-like teeth may be observed. The pre-opercle is rounded, somewhat prolonged at its angle, and without the least serrature, but with slight depressions, that give a radiated or plicated appearance to the skin. The opercle is quadrilateral, and rounded behind. The sub-opercle is large, sub-triangular, and rounded behind, with its base below. The inter-opercle is semilunar, but straight above where it joins the sub-opercle ; the gill-openings are large ; there are seven branchial rays.

The anterior dorsal fin is represented by six very short spines, placed in a groove, each of which has its membrane ; these are preceded by a short, recumbent spine, directed forwards ; the second dorsal begins nearly midway between the snout and the root of the caudal fin ; it is long, sub-falciform in shape, and has one short spinous ray and twenty-four soft rays ; the three anterior are very long and firm ; they decrease in length to the seventh ; the others are short, but of equal length to the last. The pectoral is large, and broad ; it begins behind the gill-openings, and ends before the posterior dorsal fin ; it has sixteen rays.

The ventrals are very short ; they begin just behind the origin of the pectoral, but do not extend as far back ; they are near together, and have each one simple and five branched rays, the last of which is bound to the belly by skin. The anal is shaped like the soft dorsal fin, with its three anterior rays prolonged ; but from the sixth they are short, and all of the same length ; it is preceded by two short spines, and has one spinous and twenty-one soft rays. The caudal is very long, has twenty rays, and is widely forked ; the upper branch being slightly the longer.

The scales are very small and deeply imbedded in the skin. The lateral line is

not very distinct; it runs at first about the upper third of the body, and then gently descends, so as to be near the median plane, at the extremity of the pectoral fin; it is slightly undulating in its course.

COLOUR. When first taken from the water, the entire animal is of a most brilliant silver-colour; but it soon becomes clouded with a pale blue above, and assumes a bright golden colour below; the dorsal fin is semi-transparent; the anal and caudal are yellow, more or less bright.

DIMENSIONS. The entire length, from the opercle to the tip of the caudal fin, is equal to four heads and a quarter; the greatest elevation, which is opposite the anal spines, is equal to two heads; total length, twenty inches.

SPLANCHNOLOGY. The liver is large, of rather a pale colour, and consists of three lobes; though but two appear at first sight, as the right lobe is placed so deeply, that it is entirely concealed by the other viscera. The left and the central lobes are united in front by a thin portion, and are furthermore connected by bridles of the substance of the liver; the margins of the central lobe are often irregular. The gall-bladder is very large, oval in form, and placed far behind the right lobe, though generally joined to it, and projects so far to the left as to be nearly in contact with the ovary of that side. The stomach is small, not extending half the length of the abdominal cavity; and the *cul de sac* is very short. The pyloric portion is about one third as long as the stomach itself, and arises near its posterior fifth; its walls are thicker than the other parts of its stomach, with a remarkable pyloric contraction. The small intestine is very capacious, and is at first directed forwards; but soon it runs nearly to the vent, whence it is reflected to the pylorus, and then it turns backward to end in the rectum, with a well-marked rectal valve. There are twelve or fourteen cæcal appendages; all are slender, and some of them are very long, as they reach to the vent. The spleen is dark purple, olive-shaped, but compressed, and is situated mostly on the left side. There is no air-bladder; the kidney is large and thick; and the ureter is developed into a small urinary bladder.

HABITS. The *Crevallé*, or *Cavalli*, makes its appearance in the waters near Charleston in the month of April or May, and remains during the summer, or until late in October, and even longer, if the season be warm. It feeds on various kinds of molluscous, as well as crustaceous animals; and takes the hook greedily when baited with clams, shrimps, &c., &c.

GEOGRAPHICAL DISTRIBUTION. This animal is found along the Atlantic shores of America, from Brazil to New York; it abounds also in the Gulf of Mexico, and is known at New Orleans as the *Pompynose*, probably a corruption of *pampanus*, or *pampano*.

GENERAL REMARKS. The *Cavalli*, though certainly known to Dr. Garden, and sent by him to Linnæus, was, however, first accurately described by Cuvier and Valenciennes as the *Trachinotus pampanus*.

Dr. DeKay's account of our animal is next in order, and is defective, as it was taken from a dried specimen of more than twenty years' standing; he placed it in the genus *Lichia*, with the specific name *Carolina*. But the absence of maxillary teeth, and the peculiar structure of the pharyngeal bones, would forbid its being embraced in that genus. Nor can his specific name be retained, as that of Cuvier and Valenciennes has the right of priority; unless, indeed, it could be satisfactorily proved that our Crevallé is identical with the *Gasterosteus Carolina* of Linnæus, and this cannot be done, as that animal must be a Caraux, it having a carina along its tail. Yet it is almost certain that the Crevallé of Dr. Garden, which Linnæus quotes as a *synonyme*, is the animal now under consideration; for the name Crevallé, or Cavalli, was commonly applied to this fish, even in the time of Dr. Garden, as I have been informed by his contemporaries; and if we consider the great estimation in which this fish is held by epicures, and the price it commands in market above all others, it is not probable that its name has been changed.

GENUS CARANX. — Cuvier.

CHARACTERS. Body compressed, covered with minute scales; two dorsal fins; lateral line furnished with large scales; those on its posterior half have each an elevated carina, terminating in a point behind, and thus making a continuous ridge; free spines before the anal fin; teeth minute; branchial rays seven.

CARANX DEFENSOR. — *DeKay*.*Plate XII. Fig. 1.*

SPECIFIC CHARACTERS. Head full, prominent; body above, pale brown, with a strong yellow tint; below, white, with pinkish reflections; opercle with a black blotch; pectoral fin with a dusky spot near its anterior fourth. D. 8-1-23. P. 18. V. 1-5. A. 2-1-17. C. 17.

SYNONYMES. *Caranx defensor*, *DeKay*, *Zoöl. N. Y.*, part iv. p. 120, pl. 24, fig. 72.

Caranx defensor, *Storer*, *Synops.*, p. 103.

Horse Crevallé, or Cavalli, *Vulgo*.

DESCRIPTION. This fish, without the tail, is of a sub-oval form, arched and thicker along the back, nearly straight and thinner at the belly, so that a transverse section appears elliptical, and broadest just above the median plane. The head is large and thick, though carinated above; and the profile descends in a regular curve to the nostrils, where it is slightly incurved; the snout is narrow, though rounded. The eye is very large, its lower margin being near the median plane of the head; it is placed about one diameter of the orbit from the snout, and two diameters from the posterior border of the opercle; the pupil is dark, and the iris is golden, with its posterior half covered by a nictitating membrane, which is crescentic in front, tolerably thick, and perfectly transparent. The nostrils are closely approximated, very near the eye, above its median plane, and on a line within the orbit; both are sub-oval, nearly of the same size, though the posterior is rather higher up.

The mouth is large, the upper jaw extending to the posterior border of the orbit; the lips are tolerably thick and fleshy. The upper jaw is armed with a series of moderately large, conical, and pointed teeth; those in front are largest; behind these are three or four rows of minute, card-like teeth; the lower jaw has but a single row of teeth, and these are longer than those of the upper, especially two

or three of the anterior. The vomer has a small patch of minute teeth in front, and the palate-bones a narrow group of similar teeth on each side. The tongue has a triangular patch of like minute teeth. The pharyngeal bones have conical, pointed, recurved teeth; some of them are larger than those of the jaws. The pre-opercle is rounded below and at its angle; the ascending border is nearly perpendicular, and is smooth or without serratures, but the skin at the angle is beautifully arranged in minute radiating folds. The opercle is short in the vertical direction, and terminates behind in an obtuse angle, above which it is emarginate. The sub-opercle is long, narrow, sub-triangular, with its base below. The inter-opercle is broad and semilunar. The whole head is smooth, or uncovered with scales. The gill-openings are of moderate size; there are seven branchial rays.

There are two dorsal fins; the anterior begins behind the root of the pectoral; it is preceded by a recumbent spine, and has eight erect spines, received in a groove; of these the anterior is minute, and the third is longest; the posterior dorsal is long, falciform, and has one spinous, with twenty-three soft rays, the second, third, and fourth being very long, and all stand in a groove of scales, but without any adhesion. The pectoral is long, falciform, and ends in a point beyond the origin of the anal fin; it has eighteen rays. The ventral is short; it begins nearly in a line vertical with the pectoral, but is not half as long, as it terminates just behind the vent, and has one slender spinous and five soft rays. The anal fin is preceded by two free spines, the first slender, the second stout, and both are retained by a fold of skin in a groove; the soft portion is shaped like the second dorsal, and though shorter, yet it extends as far back, and has one spinous and seventeen soft rays, which stand in a groove of scales. The caudal is long, forked from its root, and has seventeen rays.

The scales are exceedingly minute; the lateral line is at first much arched, to correspond with the dorsal outline, and runs along the superior fourth of the body to the anal fin, when it descends to the median plane, and thus continues; this straight portion is armed with about thirty-two plates; they begin small, but

increase in size, as well as in the elevation of their carina and in the length of their spines, to the middle of the space existing between the posterior extremity of the dorsal and the root of the caudal fin, whence they decrease rapidly in size.

COLOUR. The head above is palest brown, often with an olive tint, or at times a shade of green; the upper, as well as the lower jaw, and throat, are silvery-white; the body above the lateral line is of the palest brown, with a strong golden tint; below, it is silvery-white or golden, with purple reflections, or iridescent in certain lights. The opercle has at its posterior border, and above its angle, a dark blotch; the anterior dorsal fin is semi-transparent, with obscure dusky shades; the pectoral is transparent, with a faint yellowish tint, and a dusky blotch on its inner face, about its anterior fourth; if the fin be stretched, it will be seen that the membrane is not coloured, but the rays only, which then appear as seven short, black lines; the ventral is white, semi-transparent, with its anterior rays and membrane tinted yellow near the middle; the anal has its nine anterior rays yellow, particularly so in front; the two spines before the anal are white, tinted yellow, and the membrane of the posterior spine is yellow; the caudal is yellow, more or less clouded with light brown.

SPLANCHNOLOGY. The liver is large and trilobate behind, though there is no mark of separation before, as all appears one mass, until it be removed from the body; the left lobe is longest, as the right does not extend beyond its middle; both project into the hypochondria, especially the left. The stomach is large, and extends three fourths the length of the abdomen; its walls are very thick, and its mucous surface is marked with numerous longitudinal folds; the pyloric portion begins about its posterior fourth, and is short, with its walls even thicker than the stomach itself. There are numerous cæcal appendages. The spleen is large, scaphoid in form, broadest behind, and placed far back. The air-bladder is large, with thin walls; it is full and rounded in front, but bifurcates in two small horns behind. The kidney is large, thick, and opens into a urinary bladder.

HABITS. The *Horse Crevallé* abounds along the shores of Carolina during the summer months, and is mostly found in deep water. Its food seems to be vari-

ous small fish, and portions of crustaceous animals have also been found in its stomach.

GEOGRAPHICAL DISTRIBUTION. The known range of the *Caranx defensor* is from New York to Florida.

GENERAL REMARKS. This fish was first made known to naturalists by Dr. DeKay, in his Zoölogy of New York.

CARANX HIPPOS. — *Linnaeus*.

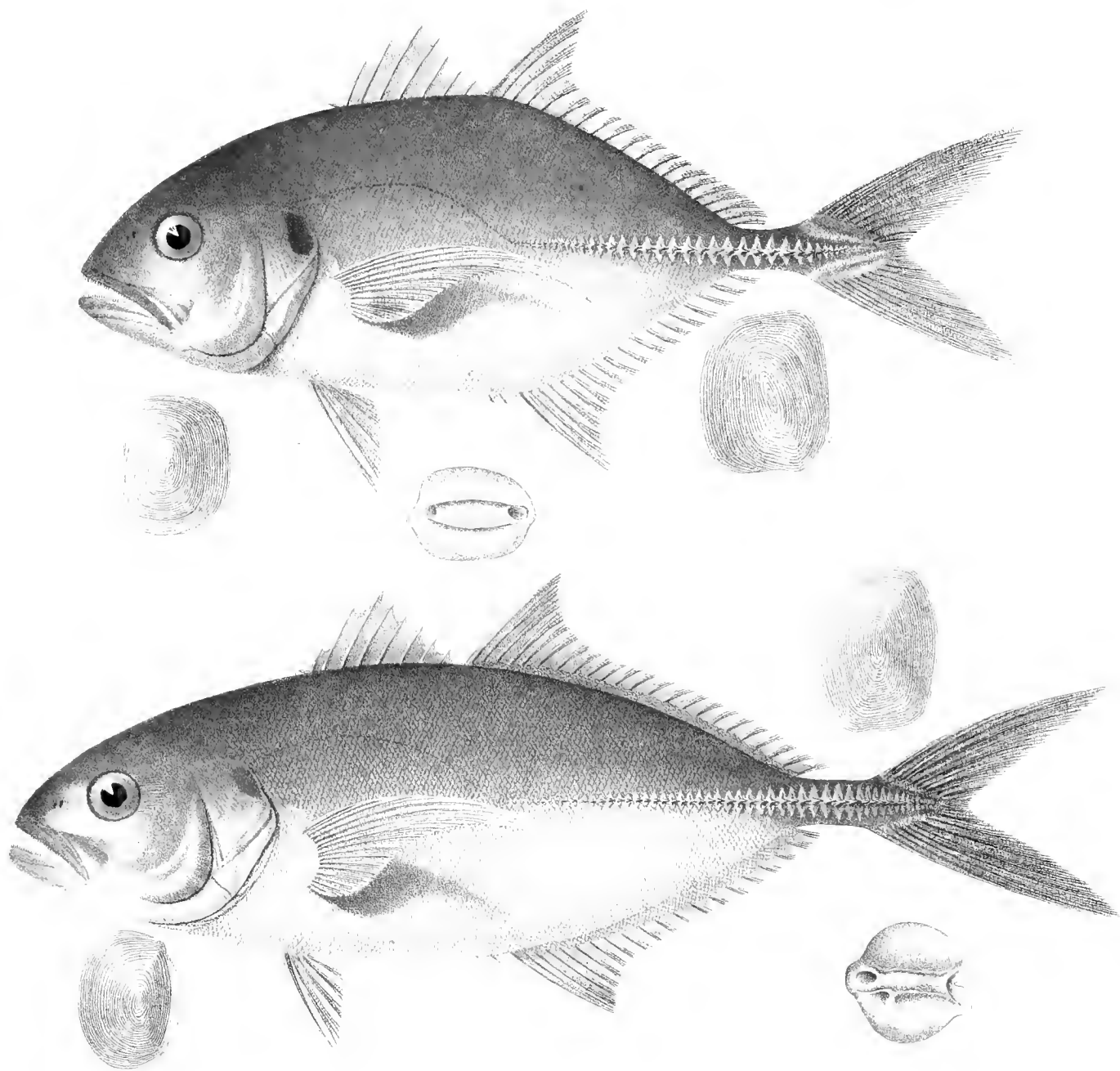
Plate XII. Fig. 2.

SPECIFIC CHARACTERS. Body elongated, sub-compressed; above greenish-olive; sides and belly golden; a dusky spot at the superior and posterior part of the opercle. D. 8-1-24. P. 19. V. 1-5. A. 2-1-20. C. 18.

SYNONYMES. *Scomber hippos*, *Lin.*, Sys. Nat., tom. i. p. 494.
Scomber chrysos, *Mitch.*, Lit. and Phil. Trans. N. Y., vol. i. p. 424.
Caranx chrysos, *Cuv. et Val.*, Hist. Nat. Poiss., tom. ix. p. 98.
Caranx chrysos, *DeKay*, Zoöl. N. Y., part iv. p. 121, pl. 27, fig. 85.
Caranx chrysos, *Storer*, Synops., p. 101.
Horse Crevallé, *Vulgo*.

DESCRIPTION. The form of this fish without the tail is elliptical, elongated, and slightly more arched at the belly than the preceding species; it is sharper along the outline of the back, and thicker at the belly, so that a transverse section is elliptical, and rather broadest just below the lateral line. The head is large, with the snout narrow, though rounded, and the facial outline descends in a regular curve, and is by no means as much arched at the forehead as it is in the *Caranx defensor*, nor is it incurved at the nostrils. The eye is large, with its inferior margin about the median plane of the head, rather more than its diameter from the snout, and

PL. XII



two diameters from the angle of the opercle; the pupil is deep blue, the iris golden, intermixed with greenish-olive, and is covered behind with a nictitating membrane. The nostrils are closely approximated; the posterior and larger is oval, and more elevated than the anterior, which is semilunar; they are midway between the eye and snout, near the anterior extremity of the supra-orbital ridge, and on a line within the orbit.

The mouth is large, with tolerably thick lips; the lower jaw is apparently longer than the upper when the mouth is open, but is in fact shorter, as its teeth are received within it when the mouth is closed. The upper jaw is armed with a series of small teeth, conical and pointed; within this are several rows of minute, card-like teeth; the lower jaw has but a single series, similar to the external row of the upper jaw, and a few scattered teeth. The vomer has a small patch of minute teeth in front; and each palate-bone has an oblong group, broadest near its posterior part. The tongue is furnished with an elongated, quadrilateral patch of similar minute teeth. The free margin of the pre-opercle is semilunar, and smooth, or without spines or serratures. The opercle is irregularly four-sided, with its anterior inferior angle prolonged and pointed, and it terminates in two flat points behind, the inferior being the longer and angular. The sub-opercle is nearly triangular, elongated, with its apex upwards and truncated. The inter-opercle is very large, broad, and semicircular. The whole head is smooth, or without scales, except a few on the cheeks, in front of the pre-opercle. The gill-openings are large; there are seven branchial rays.

There are two dorsal fins; the anterior is elevated, and is preceded by a recumbent spine; it has eight spines; the first is minute, the third is longest, and the eighth very short, and all are received in a groove when the fin is folded; the posterior dorsal is long, falciform, and has one spinous and twenty-four soft rays, with a wall of scales at their root; the first, second, and third rays are longest. The pectoral is exceedingly long, slender, and beautifully falciform; it begins at the opercle, and ends pointedly, in a line with the fourth anal ray; it has nineteen rays. The ventral is short; it arises in a line with the posterior margin of the

root of the pectoral fin, but does not extend as far back, and has one spinous and five soft rays. The anal is shaped like the soft dorsal, but is shorter, though it extends as far back, and has a similar wall of scales at its root; it has one spinous and twenty soft rays, and is preceded by two spines, placed in a groove, the anterior of which is very small. The caudal is broadly forked, and has eighteen rays.

The lateral line is, at first, near the superior fourth of the body, and concurrent with the dorsal outline; but at the posterior third of the anterior dorsal fin it curves gradually down, and is in the median plane of the body at the posterior dorsal; and thus it runs straight to the tail; this straight portion is covered with fifty plates, small at first, but increasing in size to the middle of the space between the extremity of the dorsal and the root of the caudal fin, when they gradually again decrease in size. These plates are broad vertically, but narrow in the antero-posterior direction, and are armed with a carina, which terminates behind in a spine or pointed extremity.

COLOUR. The head above is greenish-olive, with a strong yellow tint; the cheeks, pre-opercle, and opercle are golden, the latter with a black blotch at its posterior angle; the back is bright greenish-olive, tinted with yellow; the sides and belly are golden; the anterior dorsal is semi-transparent, with slight dusky shades; the posterior dorsal is also semi-transparent, with numerous minute dusky spots, and some few of its posterior rays are dark; the pectoral is perfectly transparent, with a pale yellowish tint, most distinct near its root; the ventral fin has its rays of a light colour, shaded with blue; the last ray is white, and the membrane is transparent; the anal is semi-transparent in front, with a yellowish tint behind; the caudal is yellowish-brown.

DIMENSIONS. The length, from the opercle to the tip of the caudal fin, is equal to three heads and a quarter; the elevation, to a head and one eighth; total length, sixteen inches.

SPLANCHNOLOGY. The peritoncum is silvery; the liver is large, firm, dark-coloured, and seems as one mass, if observed from below, as there is no mark of fissures; it is thick before and thin behind, with an irregular margin; and is slightly longest on the left side; when the liver is removed, three prominences appear on its anterior part; a central very short, and a right and left lateral, which are long, pointed, and project forward. The gall-bladder is an elongated tube, which extends beyond the stomach, and is somewhat convoluted. The stomach is rather small, sub-cylindrical, pointed behind, with tolerably thick walls, and numerous longitudinal folds on its mucous membrane; the pyloric portion is large and long; it arises from behind the posterior fourth of the stomach, and has thicker and firmer walls, with a very remarkable pyloric contraction. The small intestine has thick and firm walls, though the folds on its inner face are but small; it runs nearly to the vent, and is then reflected to the pylorus, whence it turns back, to end after a short distance in the rectum, with a large rectal valve. There are numerous cæcal appendages, small, delicate, but rather long; they are firmly united together, and partially arranged into two or three great masses. The spleen is short, but broad and thick, and is placed rather obliquely, from right to left. The testicles when filled are very large, broad, sub-triquetral, and extend more than half their length behind the vent, and end in a point; they do not unite in substance, but a short excretory duct goes from near the centre of each. The air-bladder is large, and extends throughout the abdomen; it is broad and truncated before, with a minute horn on each side of its anterior part, which runs a short distance forwards and outwards; behind, it is subdivided into two horns. The kidney is large and broad.

HABITS. This animal is so seldom seen in the waters of South Carolina, that we are unacquainted with its habits.

GEOGRAPHICAL DISTRIBUTION. The *Caranx hippos* has a wide range along the Atlantic coast. Dr. Storer found it in the waters of Massachusetts; and I have received specimens from Florida.

GENERAL REMARKS. This fish was undoubtedly first described by Linnæus as the *Scomber hippos*, and from specimens found in Carolina, which were sent him by Dr. Garden.

Dr. Mitchill long after observed the animal at New York, and, supposing it to be an undescribed species of Scomber, he applied to it the specific name *chrysos*; and in this he has been followed by most ichthyologists.

Cuvier and Valenciennes, although they believe it identical with the *Scomber hippos* of Linnaeus, have retained the specific name of Dr. Mitchill, instead of that applied to it by the celebrated Swedish naturalist, by whom it was first described.

CARANX FALCATUS. — *Holbrook.*

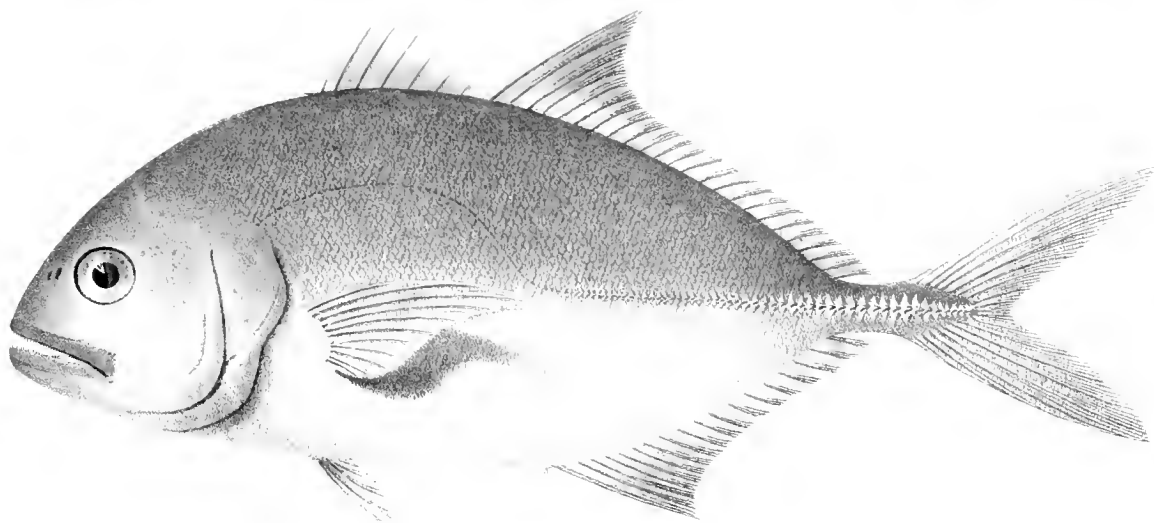
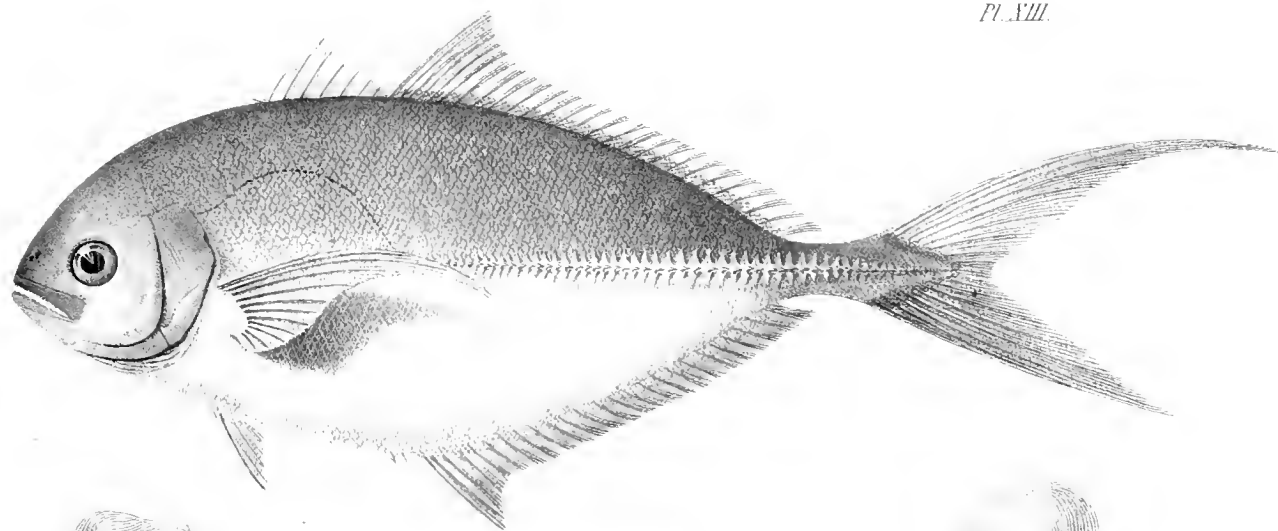
Plate XIII. Fig. 2.

SPECIFIC CHARACTERS. Body oval, compressed; yellowish, shaded with pale blue, above the lateral line, yellow below it; lateral line with fifty plates; tail yellow, widely forked, upper branch longest. D. 7-1-28. P. 16. V. 5. A. 2-1-25. C. 19.

DESCRIPTION. The form of this fish, without the tail, is nearly oval; it is much compressed, with the head short, and the facial outline descending in a gentle curve to the snout, which is rounded, though narrow. The eye is large, and occupies the middle third of the head, in the vertical direction; with its posterior margin rather nearer the snout than to the posterior margin of the opercle. The nostrils are close together, nearly midway between the eye and snout, and on a line within the orbit; the posterior and larger is sub-round, but the anterior is ovoidal. The mouth is small; both jaws are armed with a single row of slender, conical teeth. There is a small patch of minute teeth on the vomer, and a small, narrow group of similar teeth on each palate-bone. The tongue is small, narrow, and furnished with a few minute teeth near its root. The pharyngeal bones are armed with numerous card-like teeth, which are longer than those of the jaws.

The pre-opercle has its angle rounded and short. The opercle is narrow, trapezoid in form, prolonged and pointed below, and slightly emarginate behind. The sub-opercle is quadrilateral, long, and narrow. The inter-opercle is broad and semicircular. The head is smooth, or with only a few scales behind the orbit.

Pl. XIII.



Thalassoma muricatum (Pinn. Chus.)^d

There are two dorsal fins; the anterior is placed in a groove, and has seven spines; it is preceded by a short, recumbent spine, slightly elevated and directed forwards. The posterior dorsal has one spinous and twenty-eight soft rays; it is long and low, its three or four anterior rays excepted, and these are but moderately elevated; the rays are all protected by a sheath of scales, which is thin at their roots, and ascends one fourth of their length, but without any adhesion. The pectoral is falciform in shape, and very long, as it extends to the anterior third of the soft dorsal fin; it has sixteen rays. The ventral is small, and very short, though it extends beyond the vent, and has five rays. The anal is shaped like the soft dorsal, and has one spinous and twenty-five soft rays, protected in like manner at their roots; it is preceded by two short spines placed in a groove. The caudal is very long and widely forked, the upper branch being more than one third longer than the lower; it has nineteen rays.

The lateral line is at first almost semicircular; but at the origin of the soft dorsal it descends to the median plane, and is then straight; it is covered with about fifty plates, which begin with the soft dorsal, and increase in size to the thirty-fifth, whence they decrease rapidly. The scales are minute; those of the lateral line are elongated quadrilateral, with one angle prolonged and rounded; its duct is large, begins far forward, and bifurcates near the posterior border.

COLOUR. The superior part of the head, and the body above the lateral line, are palest brown, with a slight bluish tint; the lower jaw, opercle, and sides are yellow; the belly is silvery, with a slight golden tint; the anterior dorsal is transparent; the posterior is transparent, but with a yellowish tint; the caudal is yellow.

DIMENSIONS. The head is one sixth of the entire length of the animal; the greatest elevation without the fins is equal to one head and seven eighths; total length, nine inches.

HABITS?

GEOGRAPHICAL DISTRIBUTION. The only specimen of this animal that I have seen was taken in deep water, about twenty miles from Charleston.

GENERAL REMARKS. The *Caranx falcatus* bears a striking resemblance, in many respects, to the figure of the *Caranx amblyrhynchus* of Cuvier and Valenciennes; but its shape is more elongated; the anterior part of the dorsal and anal fins are more elevated; and the upper fork of its tail is more than one third longer than its lower. It is to be regretted that this animal was accidentally destroyed before a complete description could be made of its splanchnology, &c. Believing it to be undescribed, I have applied to it the specific name *falcatus*, from the shape of the upper fork of the caudal fin.

CARANX RICHARDI. — *Hollbrook*.

Plate XIII. Fig. 1.

SPECIFIC CHARACTERS. Body sub-oval, compressed; unspotted; palest blue above the lateral line; silvery tinted with yellow below it; lateral line with thirty plates. D. 7-1-22. V. 1-5. A. 1-20. C. 20. Total length, eight inches.

GENERAL REMARKS. Only one specimen of this fish, and that taken near Charleston, has as yet fallen under my observation; and, like the last-described animal, it was accidentally destroyed before it could be thoroughly examined; a more ample description may be expected hereafter; yet the form, the colouring, the number of fin-rays, &c., can, I think, be relied on, as they were observed by Mr. Richard, whose accuracy is well known. It resembles the *Caranx fallax* of Cuvier and Valenciennes, but it wants the dark colour of the anterior rays of the second dorsal fin.

GENUS ELACATE. — *Cuvier*.

CHARACTERS. Head depressed; body elongated; no finlets; tail without a carina; anal fin without free spines in front; branchial rays seven.

ELACATE CANADA. — *Linnaeus*.

Plate XIV. Fig. 1.

SPECIFIC CHARACTERS. Head large, depressed; body sub-cylindrical, without finlets; dusky olive-brown, or black above; a light olive-brown horizontal band extends from the opercle to the tail, with a lighter band below, and a clouded white one above it; belly white; tail without a carina. D. 8-2-30. P. 20. V. 1-5. A. 2-23. C. 21.

- SYNONYMES. *Gasterosteus canadus*, *Lin.*, Syst. Nat., tom. i. p. 491.
Gasterosteus canadus, *Gmel.*, ed. Syst. Nat., vol. i. pars iii. p. 1328.
Scomber niger, *Bloch*, Ichth., pars x. p. 148, pl. 337.
Centronote Gardénien, *Lacép.*, Hist. Nat. Poiss., tom. iii. p. 357.
Centronotus spinosus, *Mitch.*, Trans. Lit. and Phil. Soc. N. Y., vol. i. p. 490, pl. 3, fig. 9.
Elacate Atlantica, *Cuv. et Val.*, Hist. Nat. Poiss., tom. viii. p. 334, pl. 233.
Elacate Atlantica, *DeKay*, Zool. N. Y., part iv. p. 113, pl. 25, fig. 77.
Elacate Atlantica, *Storer*, Synops., p. 111.
Cobia, *Vulgo*.

DESCRIPTION. The general form of this fish is elongated, sub-cylindrical, tapering gradually to the tail, and flattened above from the first dorsal spine to the snout; which gives it the appearance of an *Echeneis*. The head is large, flat above, but full at the sides; the upper jaw is flat, broad, rounded, and nearly semicircular at the snout; the lower is narrower, thicker, terminates in a more

pointed manner, and projects beyond the upper, so that some of its teeth are exposed. The eyes are rather large, placed on the sides of the head, and very near its superior plane; the pupil is dusky, the iris silvery-white. The nostrils are small, on the same plane, nearer the orbit than the snout, and in a line with its upper margin; the anterior is slightly oval, the posterior is round.

The mouth is large; both the upper and lower jaws are furnished with several series of short, conical, sharp-pointed, and deeply-set teeth; there is, however, a space in the mesial line, both in the upper and lower, where they do not exist; these teeth are all very stout at their roots, in proportion to their length and size. The tongue is very large, and free for some distance, rounded in front, and covered to its tip with minute teeth, which make it rough like sand-paper; near the centre of its base is an oblong group of large teeth; and in the palate-bone is another and extensive rhomboidal group of teeth, nearly as large as those in the jaws. The pharyngeal bones are armed with teeth, which are rather larger than the others, and slightly curved backwards. The pre-opercle is rounded at its angle, slightly so at its posterior border, and is covered with small, round, entire scales; as are also the cheeks and temples. The opercle is large, with a smooth border, but its surface is marked with several minute elevations, disposed in a radiated manner. The gill-openings are large; there are seven branchial rays.

The soft dorsal fin is preceded by eight short, strong, compressed, sub-triangular spines; these spines begin a little behind the gills, opposite the pectoral fin; and in the old animal they are so deeply notched near their roots in front, as to appear at first sight double; each has a thin, depressed membrane attached to its posterior border, which often runs to be connected with the root of the anterior part of the spine behind it; they are all movable, and placed in a groove. The soft or second portion of the dorsal is thick, falciform at first, and elevated, but soon it becomes depressed, and so continues to the caudal fin; it has its two or three posterior rays slightly prolonged to end in a point; there are two spinous and thirty soft rays, which project a little beyond the membrane that unites them. The pectoral fin is large, falciform, and pointed behind; it begins near the opercle, and

terminates with the last dorsal spine, and has a fold of skin that runs for some distance above its superior margin. The ventral arises very near the root of the pectoral, and is about half as long; it is near its fellow, and has its internal margin united for some distance to the belly. The anal fin is long, and very thick; it begins about the anterior third of the soft dorsal, and reaches so far back as to terminate at the same point with it behind, where it is a little prolonged and pointed; it has twenty-three rays; and the membrane that unites them is covered with minute scales, clustered in different places. The caudal is large and strong, nearly one fourth the whole length of the body, and deeply crescentic; the upper horn is the longer, and both are covered with small scales.

The scales are of an oblong shape, rounded before and behind, and so minute as to give a granulated appearance to the skin when it is dried. The lateral line runs at first very near the back, and has slight undulations in its course as far as the eighth dorsal-spine, when it curves down to the median plane, and thus continues; its scales are destitute of a tube.

COLOUR. When first taken out of the water, the head above and the back are dark olive-brown; but they assume in a short time a bluish-black colour; the cheeks below the eye, and the lower jaw, are silvery, faintly tinted with red; a broad, olive-brown, horizontal band or stripe begins at the opercle, and runs over the pectoral fin, to the tail; both above and below this band is another of lighter colour; the one above is narrow and indistinct; the one below is broader and paler; a second horizontal olive bar, but of lighter tint, and shorter than the first, begins behind the origin of the pectoral; the abdomen is entirely white; the dorsal, anal, and caudal fins are olive-brown above, and almost black at their base; the ventral is white, clouded in places with pale olive, and has its anterior border tinted with red.

DIMENSIONS. The head is one fifth the entire length; the greatest elevation is rather more than half a head. This fish sometimes attains a great size; I have seen a specimen more than four feet long.

SPLANCHNOLOGY. The stomach is very large, and extends to the posterior third of the abdomen ; it is rather rounded behind, and has large fasciculi of longitudinal and transverse muscular fibres, that give to its mucous membrane a reticulated appearance ; this is, however, not permanent, but disappears on distention. The pyloric portion of the stomach begins far back, about its posterior third ; it is very short, and soon terminates in the duodenum, with a pyloric contraction well marked externally. The duodenum has numerous and singular cœcal appendages ; they are placed on each side the intestine, and are about twenty-six in number, as principal trunks ; these soon subdivide into branches, two or three each, and from these are given off others, so suddenly, so numerous, and so minute, as to resemble a tassel ; or when they are bound to the trunk, from which they arise, by peritonæum, they, with the trunk, resemble a common mushroom ; these minute appendages are about a line in diameter, and from a quarter of an inch to an inch in length ; and it is remarkable, that I have always found the entrance of most of them closed with a very small, thread-like entozoötic animal. The liver is very large, and in colour resembles that of the ox ; it consists of a central or transverse portion, thick, large, and of two lobes, which are not separated from it by fissures ; the lobes are full and round before, where they are in contact with the diaphragm, and extend backwards to the anterior fourth of the abdomen, or a little more. The gall-bladder is placed far back ; it is narrow, and seems only a slight development of the cystic duct. The small intestine runs at first forwards, is then reflected backwards on the left of the mesial line, nearly to the vent, whence it returns nearly to its point of departure, and then is reflected backward, to end in the large intestine, which is more capacious, but has thinner walls. The spleen is large, flattened, sub-triquetral, of a dark purple colour, and situated far back. The testicles are moderately long, obovate, large, and unite into one near the vent, to open by a common duct. The kidney is large, very thick, broader posteriorly, narrower anteriorly, where it is bilobed, each lobe running to the diaphragm, where it increases in size ; these lobes only come in contact about the anterior third of the abdomen, where they unite into one ; yet the ureters remain single to near their termination in the bladder, which is small, and seems only a slight development of the conjoined ureters.

HABITS. The *Cobia* is a solitary fish ; it prefers deep and clear water, and is only taken singly, and with the hook. It arrives on the coast of Carolina late in May, and is occasionally captured until September, when it is no longer seen in our waters. It is exceedingly voracious, and destroys many smaller fish, which make its ordinary food ; though it does not reject crustaceous animals, as Dr. Mitchill found in the stomach of one individual the remains of more than twenty crabs, which led him to call it *Crab-eater*.

GEOGRAPHICAL DISTRIBUTION. The range of this animal is great, as it is common to the Atlantic shores of America; its known southern limit on our continent is Brazil, and its northern, Massachusetts Bay, where it has been observed by Dr. Storer.

GENERAL REMARKS. This fish, it appears to me, is the *Gasterosteus canadus* of Linnæus, which he describes from a specimen sent him by Dr. Garden, of Charleston, and I have, consequently, restored his specific name. His description in the *Systema Naturæ* agrees well enough in most respects with the animal now under consideration, with the exception of the ventral fin; which, he says, has seven rays, instead of six; and to the pectoral he gives but *two rays*, which, as Cuvier and Valenciennes well remark, is doubtless a typographical error, *two* for *twenty rays*, which is the exact number.

Lacépède arranged this fish in his genus *Centronotus*, and described it under a new specific name, "*Gardénien*," though his whole description is drawn from Linnæus, and with the same remarkable typographical error, as to the number of rays in the pectoral fin.

Bloch, in his great work on Ichthyology, describes this fish as the *Scomber niger*, and, as he avers,* from the manuscript and drawing of Prince Maurice of Nassau, who was Governor of Brazil from 1637 to 1664. He remarks, however, that the manuscript does not state the number of branchial rays, but that it gives P. 12, V. 6, A. 21, C. 17, and D. 23 rays, preceded by "*huit aiguillons dégagés*." Bloch's plate is, however, defective, for the head is represented as too full, rounded, and too much elevated, like a *Coryphæna*, and the scales are too large; though in his description he properly observes they are "*petites, minces, et lisses*."

Cuvier and Valenciennes, after an examination of the manuscript of Prince

* Bloch, Ichthyologie, pars x. p. 48.

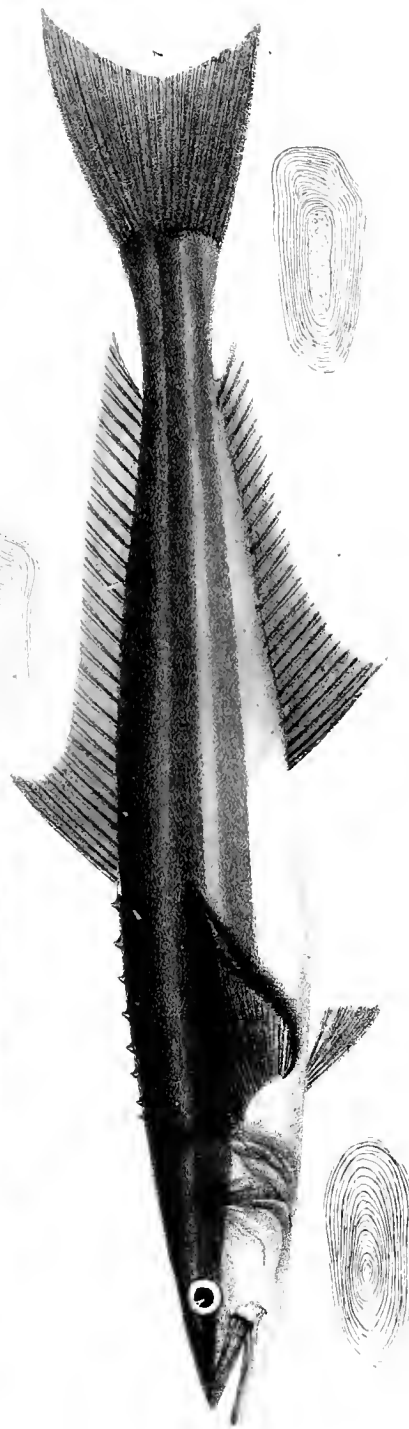
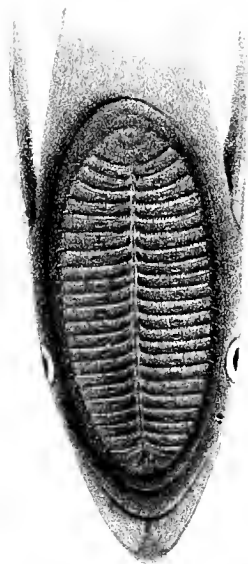
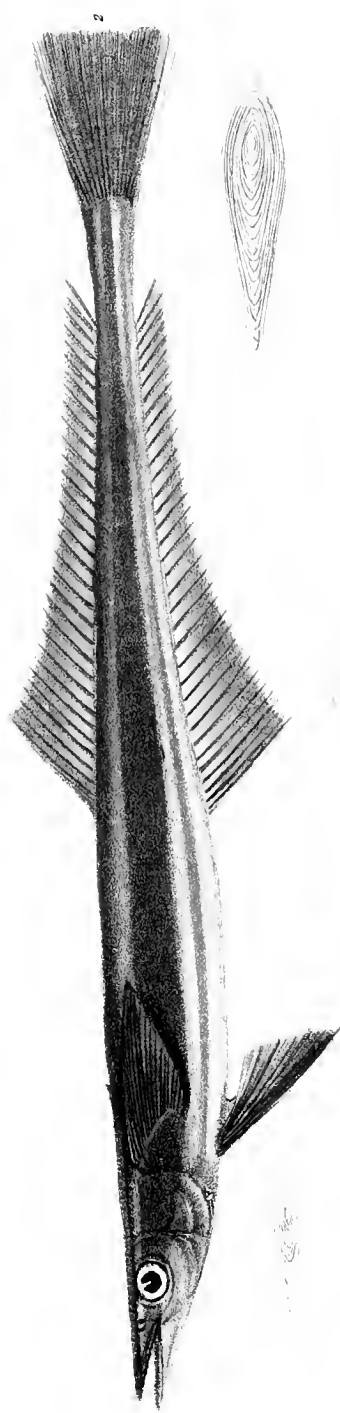
Maurice, declare that Bloch has added ventral fins to his plate, which are not seen in the original drawing, and that he coloured them after the description of Maregrave, who was in Brazil with Prince Maurice, and published a work on the natural history of that country.* In this work he gives a plate of our animal, and describes it as a fish, sometimes nine feet in length, and thick as a man's body, very dark above, chalky-white below, &c., &c., and called by the Brazilians *ceixu pira*.

Dr. Mitchill's description of the Cobia is the best up to his time, as it was taken from a recent specimen, and is accompanied by a very good figure; yet some of his observations are incomprehensible. He says, for instance, "I have been obliged to constitute a new family (genus) to receive and accommodate a fish," &c., &c., and this he calls *Centronotus*, when a genus of the same name, and for the same fish, had been established by Lacépède more than twenty years before.

Cuvier and Valenciennes have arranged the Cobia in the genus Elacate, and with the specific name *Atlantica*, although they observe, "*Il y a toute apparence que cette Elacate est la Gasterosteus canadus*" of Linnæus. Perhaps time will prove that the specific name they have chosen is no more characteristic than that of the great Swedish naturalist, as this fish may be found to inhabit the South Seas, as well as the Atlantic Ocean, even if it has not been found there already, in the *Elacate Pondiceriana*.

* Hist. Rer. Nat. Brasilæ.

PL. XIV.



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GENUS ECHENEIS.—*Linnaeus*.

CHARACTERS. Head large, flat, and covered above with an oval disk formed by numerous transverse bony plates, with their edges directed backwards and serrated; maxillary, inter-maxillary, and vomerine teeth small; soft dorsal fin opposite the anal; body elongated, sub-fusiform; scales minute, cycloid; branchial rays eight.

ECHENEIS LINEATA.—*Holbrook*.

Plate XIV. Fig. 2.

SPECIFIC CHARACTERS. Body above olive-brown; belly whitish; a dark horizontal band begins at the lower jaw, and runs to the tail; above it is a pale band, and below, one of bright sulphur-colour; upper and lower margin of caudal white; adhesive disk with twenty-one plates. D. 37. P. 18. V. 1–5. A. 33. C. 18.

SYNONYME. Suck Fish.

DESCRIPTION. The head is large, broad, concave above, where it is occupied by the oval adhesive disk, which extends from near the anterior margin of the vomer in front to the middle of the pectoral fin behind; its border is fleshy, thick, free, movable, and elevated. It is divided in the mesial line; and on each side are twenty-one transverse plates, their free margins directed backwards and serrated. The snout is broad and rounded. The eyes occupy the median plane of the head, and are midway between the tip of the lower jaw and the posterior margin of the opercle. The nostrils are small, closely approximated, and nearer to the orbit than to the snout. The mouth is horizontal, broad, but short, as it extends only to the anterior nostril; the lower jaw is rather pointed in front, and is so prolonged beyond the upper that its teeth are exposed when the mouth is closed. Both jaws are armed with numerous small, card-like teeth; there are two broad groups in the lower jaw; that of the upper is very narrow. The vomer is very large and

broad, and has an extensive group of minute teeth in front ; from this group run back two bands of similar teeth for some distance on the sides of the vomer, leaving the central portion naked. The tongue is covered with minute teeth ; the pharyngeal bones are armed like the jaws.

The pre-opercle is narrow, rounded below and at the angle, which is entire. The opercle is sub-triangular, rounded behind and below ; thick, straight, and with a foramen in front ; thin, and terminating in an obtuse point behind. The sub-opercle is ensiform, thin, rounded below, and ending in a point beyond the opercle behind. The inter-opercle is long and narrow, with its base behind. There are nine branchial rays ; the posterior four are attached to the outer side of the os hyoides, and the anterior are joined to its inner margin.

The body of this fish is very similar in form to that of *Elacate canadæ* ; elongated, broad in front, sub-round in the middle, and gradually tapering and slightly compressed at the tail. The soft dorsal fin is very long, not much elevated, and with nearly a straight margin ; it begins rather nearer to the tip of the lower jaw than to the extremity of the caudal fin, and has thirty-seven soft rays, of which the third, fourth, and fifth are longest, and from this they decrease gradually in length to the last, which is slightly prolonged. The pectoral is large, broad, pointed behind, and begins at the opercle, with its superior margin near the dorsal outline ; it has nineteen rays. The ventral begins near the root of the pectoral, and ends with it behind ; it is narrow, placed in a depression, and has one spinous and five soft rays. The anal is similar in shape to the dorsal ; it begins with it in front, and is coterminous with it behind ; it has thirty-two rays. The caudal is large, entire, or but slightly semi-lunate, and has sixteen rays.

The scales are lanceolate in form, and so very small as to give a granular appearance to the skin when dry. The lateral line begins near the disk above the pectoral fin, but it soon descends to the median plane, and thus continues to the end ; its scale has no tube.

COLOUR. When just taken from the water, the body above is dark, the belly

and lower jaw are white, and from the tip of the latter runs a dark horizontal band along the median plane to the tail, interrupted only at the eye and at the pectoral fin; above this is a narrow band of clouded yellow, which begins at the upper jaw, and passes above the pectoral, and is of the same extent; below the dark band is another of sulphur-colour, which begins near the angle of the mouth, and is continued to the root of the caudal fin, and beneath this latter band is still another, very narrow, though of equal extent and of pale gray colour; the abdomen is milky white, and this colour, though much clouded, is continued along the root of the anal fin; the dorsal, anal, and ventral fins have a bluish or purplish tint; the former has the tips of its six or seven anterior rays white; the caudal is bluish, with the upper and lower margins white.

DIMENSIONS. The head is nearly one fifth of the entire length; the elevation is half a head; total length, two feet.

SPLANCHNOLOGY. The liver is large; it consists of two lobes united below by a broad, thin portion, so that the division into lobes is only seen on its dorsal surface; it is thick in front, but its posterior margin is thin and irregular. The gall-bladder is very long, olive-shaped, pale green, and with very thick walls; it is placed on the left of the right lobe, and is entirely detached from it. The stomach is elongated, conical, pointed behind, and reaches to the posterior fourth of the abdomen; its muscular walls are rather thin, and there are numerous folds on its mucous surface; its pyloric portion is exceedingly short, and is very near the diaphragm. The small intestine runs nearly to the vent, and then returns to the pylorus, whence it is reflected to end in the rectum, which is short and has a rather prominent valve. All these organs are united by cellular tissue. There are seven cæcal appendages, varying in length from half an inch to an inch and a half, and all are slender. The spleen is small, long, sub-triquetrous in form, and is placed on the right side of the stomach. The testicles are long and slender, and open by a common duct behind the vent. The kidneys are large in front, separated in the middle, and unite again behind by a thin layer; the urinary bladder is large.

HABITS. The habits of this fish are very singular, for by means of its oval disk it can produce a vacuum, and thus attach itself to other objects, and be carried from place to place without any exertion of its own; and it is often found adhering to the bottoms of ships or boats, or to the bodies of sharks or other fishes. There can be no doubt, however, that it also roams about by itself in search of food, as it is not unfrequently taken with Black-fish, and is attracted by the same bait.

GEOGRAPHICAL DISTRIBUTION. The *Echeneis lineata* ranges along the coast, from Carolina to Cape Florida.

GENERAL REMARKS. There has been considerable difficulty in assigning to the animals of this genus their proper position; most ichthyologists have of late placed them in a family by themselves, *Echeneidæ*; but the researches of Agassiz have at last pointed out their true position. He has proved that the adhesive disk is a modified anterior dorsal fin, produced by the development of several of the anterior dorsal spines; and in fact the inter-spinal apophyses are seen from below, and the rudiments of spines on its superior surface along the mesial line. They are thus, then, animals with two dorsal fins; with the ventrals thoracic; and with cycloid scales; or they belong to the family Scombridæ; and in fact they closely resemble an *Elecate* in form, teeth, &c., and like it their lateral line scales have no duct. This animal bears some resemblance to the *Echeneis albicauda* of Mitchill, but it can readily be distinguished from it by its more attenuated form, and by its colour; in the latter the margins of all the fins are white, while in the former the upper and lower borders of the caudal, and the tips of five or six of the anterior rays of the dorsal, only are white; and besides, the sulphur-coloured lines on the sides make a distinctive character.

FAMILY SQUAMIPINNIDÆ.

CHARACTERS. Body compressed, much elevated or sub-orbicular, covered with scales; maxillary teeth bristly or trenchant; vomer and palate-bones with or without teeth; pre-opercle spinous in some, in others smooth; dorsal fin single or double; anal and soft portion of dorsal fin very thickly covered with scales at their base.

REMARKS. This family was established by Cuvier, principally from the genus *Chaetodon* of Linnaeus, in which the vertical fins are so covered with scales as

hardly to be distinguished from the trunk; to these, however, he added some less extensive genera, that are characterized by having a compressed body and scaly fins; as *Brama*, *Schneider*; *Pimelopterus*, *Lacépède*; &c. It is a very extensive family, comprising eighteen genera and one hundred and fifty-one known species, mostly inhabitants of the inter-tropical seas, though some few are found as far north as New York, and as far south as Brazil.

GENUS EPHIPPUS. — *Cuvier*.

CHARACTERS. Dorsal fin double, or deeply emarginate; spinous portion without scales, and received in a groove; soft portion thickly covered with scales; body oval, or sub-round; pectoral fin short; anal, with three spines; branchial rays six.

EPHIPPUS GIGAS. — *Parkinson*.

Plate XV. Fig. 2.

SPECIFIC CHARACTERS. Body sub-round, compressed; head short, elevated; crest of the cranium enlarged; first inter-spinal bone of the anal fin large and mallet-shaped; body above, dusky, tinged with green, or lead colour; below, dull silver. D. 8-1-21. P. 17. V. 1-5. A. 3-17. C. 17.

SYNONYMES. *Chætodon gigas*, *Parkinson*, MS.

Ephippus gigas, *Cuv. et Val.*, Hist. Nat. Poiss., tom. vii. p. 121.

Ephippus gigas, *DeKay*, Zoöl. N. Y., part iv. p. 99, pl. 23, fig. 71.

Ephippus gigas, *Storer*, Synops., p. 87.

Angel-fish, *Vulgo*.

DESCRIPTION. The form of this fish, without the tail, is sub-round, compressed at the sides, the back much arched, and the belly nearly straight. The head is moderate in length, elevated and sharp above, but thicker and rounded below, and

remarkably prominent between the eyes, with the supra-orbital ridges well developed, which gives to the profile a peculiar appearance. The eyes are large and prominent; the pupil is dark, and the iris silvery. The posterior and larger nostril is a narrow, elliptical fissure, directed downwards and forwards, and is situated on a plane below the centre of the eye, and very near the orbit; the anterior is round, much smaller, lower down, and nearer the mesial line.

The mouth is small, as it does not extend to the posterior nostril; the lips are tolerably thick, and fleshy; the upper jaw is very protractile, a little longer than the lower, and both are armed with several series of numerous slender, rather long, setiform, or bristly, sharp-pointed teeth; the pharyngeal bones have teeth of a similar form, but somewhat larger at their base, and slightly shorter. The tongue is small, rather thick, and rounded in front. The pre-opercle has its angle rounded, its ascending border nearly vertical, and both finely serrated. The opercle is narrow, round below, and terminates behind in an obtuse angle. The whole head, except the lips, is covered with scales, minute on the forehead and cheeks, larger on the pre-opercle and opercle. The gill-openings are of moderate size; there are six branchial rays.

The dorsal fin is single, but deeply emarginate; it begins opposite the middle of the pectoral, a little in front of the most elevated part of the back, and has in its anterior portion eight spines, placed in a groove; all are short, except the third, fourth, and fifth, and of these the third is greatly prolonged, and covered with skin, so that its point is concealed; the second portion has one spinous and twenty-one soft rays, the five anterior very long; the others become gradually shorter, and thus they make the posterior margin of the fin almost vertical, rounded below, and fal-ciform above. These rays, and the membrane that unites them, are covered with scales to near their tips, and they are so collected at the base of the fin, as to give it a very thick and strong appearance. The pectoral is short, broad, rather pointed, and begins as far forward as the root of the ventral, though it extends only half as far back, and is covered with minute scales for more than half its length. The ventral is long, terminates behind in a point, and has one spinous and five

soft rays, of which the anterior is prolonged, and ends in a filament, and the posterior is attached to the body by a fold of skin. The anal fin arises opposite the origin of the soft dorsal, and has three spines, placed in a groove, the first very short, the second and third more than twice as long, and eighteen soft rays, covered with scales, arranged and shaped like those of the dorsal. The caudal is large, strong, thick, crescentic, and has sixteen rays covered with scales.

The scales are small, sub-round, and finely ciliated behind; the lateral line is concurrent with the back, and consequently much arched; the supra-scapular is large and smooth.

COLOUR. The head above is dusky; the cheeks and jaws are dull silver, or lead colour; the back, along the margin of the dorsal fin, is dark, and tinged with green; the sides and belly are clouded silver, or lead colour; the soft dorsal and the anal fins are dark at their roots, but less so near their borders; the pectoral fin is transparent, slightly clouded at its base; the ventral is light and transparent; the caudal is dark at its base, but less so at its tip.

DIMENSIONS. The head is a little less than one fourth of the entire length, with the tail included; the greatest elevation without the dorsal fin is equal to two and a half heads; total length, eighteen inches.

SPLANCHNOLOGY. The liver is large; the left lobe is very stout and long, extending to the posterior extremity of the stomach, and is joined without a fissure to the transverse portion, which is also large and thick, and from its centre projects backwards a middle lobe; the right lobe is thick, but shorter than the middle. The gall-bladder is large, sub-oval, and projects behind the right lobe, to which it is attached. The stomach is of great size, nearly as long as the abdominal cavity, and has exceedingly thick walls; its posterior extremity is reflected forwards, to form the pyloric portion, which is more slender, and has thinner walls, though it is nearly as long as the stomach itself, and terminates in the duodenum, with a pyloric contraction very evident externally. There are six delicate cæcal appendages, nearly as long as the stomach. The small intestine is very long, more than five feet in the adult, and with numerous convolutions, connected together by a loose mesentery. The testicles are large, oblong, and unite in substance far back. The air-bladder is large, bifurcated in front,

and with two slender horns behind, which are prolonged on the sides of the inter-spinal bones of the anal fin. The urinary bladder is very large.

HABITS. The *Ephippus gigas* approaches our shores in the month of July, and is then taken with the hook in deep water; abundantly in some seasons, while at others very few or none are caught. It remains with us but a short time, so that little is known of its habits; it seems, however, to feed on a variety of small marine animals, and parts of fish are sometimes found in its stomach.

GEOGRAPHICAL DISTRIBUTION. The *Angel-fish* is abundant in the Gulf of Mexico, and is found on the Atlantic coast of America, from Brazil to New York.

GENERAL REMARKS. This animal was first observed on the coast of Brazil, in 1768, by James Parkinson, who made a drawing of it for Sir Joseph Banks, and called it *Chaetodon gigas*, and his specific name has been retained by later ichthyologists.

EPHIPPIUS FABER. — *Sloane*.

Plate XV. Fig. 1.

SPECIFIC CHARACTERS. Body sub-round, compressed, greatly arched; lightest silver-grey, with six vertical, dusky bars. D. 8 - 1 - 22. P. 17. V. 1 - 5. A. 3 - 18. C. 17.

SYNONYMES. Faber marinus, *Sloane*, Hist. Jam., vol. ii. p. 251, fig. 4.
 Chaetodon triostegus, *Lin.*, Syst. Nat., tom. i. p. 463.
 Zeus quadratus, *Gmel.*, Ed. Syst. Nat., tom. i. pars iii. p. 1223.
 Chaetodon triostegus, *Gmel.*, Ed. Syst. Nat., tom. i. pars iii. p. 1246.
 Chétodon forgeron, *Lacép.*, Hist. Nat. Poiss., tom. iv. pp. 283, 299.
 Sélène quadrangulaire, *Lacép.*, Hist. Nat. Poiss., tom. iv. pp. 355, 357.
 Chaetodon faber, *Shaw*, Gen. Zoöl., vol. iv. p. 340.



Chætodon faber, *Bloch*, *Ichth.*, p. 80, pl. 212, fig. 2.

Chætodon oviformis, *Mitch.*, *Trans. Lit. and Phil. Soc. N. Y.*, vol. i. pl. 5, fig. 4.

Ephippus faber, *Cur. et Val.*, *Hist. Nat. Poiss.*, tom. vii. p. 213.

Ephippus faber, *DeKay*, *Zoöl. N. Y.*, part iv. p. 97, pl. 23, fig. 68.

Ephippus faber, *Storer*, *Synops.*, p. 87.

Angel-fish, *Vulgo*.

DESCRIPTION. The form of this fish, without the tail, is sub-orbicular; the head is short, elevated, prominent between the eyes, though much less so than in *Ephippus gigas*.

The eye is placed rather above the median plane of the head, and nearer to the posterior angle of the opercle than to the snout; it is very large, with the pupil dusky, and the iris silvery, clouded with grey. The nostrils are double; the posterior and larger is an elliptical fissure, near the orbit, and directed downwards and forwards; the anterior is much smaller, round, and lower down, though on a line within the orbit.

The mouth is small, with the lips tolerably thick and fleshy; the upper jaw is slightly protractile; the lower is rather shorter, and both are armed with several closely approximated series of bristly teeth, rather largest at their roots; the pharyngeal teeth are of the same form, but slightly shorter. The tongue is smooth, and tolerably thick. The pre-opercle is rounded and finely serrated, both at its angle and ascending border, and is covered with scales, as is the whole head, except the lips and the space between the eyes. The opercle is narrow, and its scales are little less in size than those of the body. The gill-openings are large, and almost vertical; there are six branchial rays, though only three are evident without dissection.

The dorsal fin begins at the most elevated part of the back, nearly opposite the middle of the pectoral; its anterior portion has eight spines, united by a transparent membrane, and received in a groove; the first spine is minute, the second larger; the third is longest of all, and sustains a prolonged filament, which

reaches the second dorsal fin ; the seventh and eighth are very short ; the posterior portion has one spine closely united to its first ray, which is very long, and, as the rest gradually decrease in length, the posterior border of the fin appears nearly vertical, a little rounded below, and falciform above ; there are twenty-two rays. The pectoral is small, rounded behind, and placed above the inferior fourth of the body ; it has seventeen rays, with an elongated, sub-triangular fold in the axilla above.

The ventral fin is very long ; it begins before the pectoral, and extends farther back ; it has one spinous and five soft rays, the anterior of which terminates in a filament that reaches to the anal. The anal is very large, and like the posterior dorsal in form ; it has three spines, the first short, the second very long and stont, the third of equal length, but more slender, and eighteen soft rays. The dorsal, anal, and caudal fins have their soft rays, as well as the membrane that unites them, covered with scales for more than two thirds of their length.

The scales are rather small, sub-orbicular, crenated at their root, and ciliated behind ; there are about fifty in the longitudinal, and thirty-eight in the vertical direction. The lateral line is placed above the upper third of the body, and follows the arch of the back ; each scale in it has a slight elevation, caused by its duct.

COLOUR. The body is lightest silver-grey, marked with six dark, transverse bars, constant in their position ; the first descends through the eye, the second through the anterior part of the pectoral fin ; the third is incomplete ; the fourth is broadest, and runs from the posterior border of the spinous portion of the dorsal to the corresponding part of the anal fin ; the fifth runs from the middle of the soft dorsal to the middle of the anal ; the sixth is found at the base of the caudal fin.

DIMENSIONS. The entire length, from the opercle to the tip of the caudal fin, is rather more than three heads ; total length, nine inches.

SPLANCHNOLOGY. The liver is large, of rather a dark colour, with its central or transverse portion very thick and continuous, with the right and left lobes without a fissure; both lobes are full in front, and project equally into the hypochondria, though the left is larger and much longer. The gall-bladder is oval and large, but does not extend beyond the right lobe. The stomach is very large, as it extends almost the entire length of the abdominal cavity; near the vent it turns forward, and thus forms the pyloric portions, having scarcely any *cul de sac*. There are four cæcal appendages, rather slender, and nearly as long as the stomach. The small intestine is very long, more than two feet in a fish of six inches in length, and has numerous convolutions connected by a loose mesentery. The testicles are large and sub-oval, elongated; the ovaries, when full, are sub-triangular, with their bases towards the spine. The air-bladder is large, bifid in front, and has two slender, prolonged horns behind, that bend downwards and follow the course of the inter-spinal bones of the anal fin. The kidney is large before, less so in the middle, with a small accessory lobe behind.

HABITS. But little is known of the habits of the *Angel-fish*; it appears on our shores in May or June, and is then taken in considerable numbers with the seine.

GEOGRAPHICAL DISTRIBUTION. The *Ephippus faber* is found along the Atlantic coast of America, from New York to Brazil.

GENERAL REMARKS. This fish seems to have been first described by Sir Hans Sloane, in his History of Jamaica; but Broussonet* first arranged it with the genus *Chetodon*, and with the specific name *faber*, which he took from Sloane. Later ichthyologists have introduced much confusion, as may be seen by a glance at the list of synonymes; which has, however, been cleared up by Cuvier and Valenciennes, who have given the best description of this animal hitherto published.

* Ichth., Dec. i., n. iv., t. 4.

FAMILY SCIÆNIDÆ. — *Cuvier*.

CHARACTERS. Teeth in the maxillary and inter-maxillary bones; vomer and palate bones without, smooth; snout in general rounded; cranial bones cavernous; opercular bones with serratures or spines; dorsal fin single or double; vertical fins more or less covered with scales at their bases; most species have an air-bladder, often very complicated in structure, but some few are without it; scales ctenoid; the branchial rays vary in number.

GENERAL REMARKS. This is a numerous and widely extended family of fishes, being common to both continents, though the species belonging to one are never found in the other. They are abundant along the shores of Carolina, Georgia, and Florida, and constitute, perhaps, a majority of the fishes of those regions. More than two hundred and fifty different species of Sciænidæ are already known; which have been arranged by Cuvier and Valenciennes in thirty-one genera.

GENUS POGONIAS. — *Lacépède*.

CHARACTERS. Numerous barbels at the chin and lower jaw; pharyngeal bones armed with large, sub-conical, rounded, and paved teeth; dorsal fin deeply emarginate; branchial rays seven.

POGONIAS CROMIS. — *Linnaeus*.

Plate XVI. Fig. 2.

SPECIFIC CHARACTERS. Body large, compressed, arched above; dorsal fin deeply emarginate; numerous barbels at the chin and lower jaw; dull silvery, or lead-

coloured, with a bronzed tint ; a black spot behind the root of the pectoral fin.
 B. 7. D. 10 - 1 - 22. P. 18. V. 1 - 5. A. 2 - 7. C. 17.

- SYNONYMES. *Labrus cromis*, *Lin.*, Syst. Nat., tom. i. p. 479.
Labrus cromis, *Gmel.*, Ed. Syst. Nat., tom. i. pars iii. p. 1292.
La Sciène chromis, *Lacép.*, Hist. Nat. Poiss., tom. iv. p. 184.
Labrus —, Drum-fish, *Schoepff*, Schrift. der Gesells. Nat. Freund., b. viii. st. ii. p. 158.
Sciæna gigas, *Mitch.*, Trans. Lit. and Phil. Soc. N. Y., vol. i. p. 412, pl. 5, fig. 10.
Sciæna fusca, *Mitch.*, Trans. Lit. and Phil. Soc. N. Y., vol. i. p. 409.
Pogonias chromis, *Cuv. et Val.*, Hist. Nat. Poiss., tom. v. p. 206.
Pogonias chromis, *DeKay*, Zoöl. N. Y., part iv. p. 80.
Pogonias chromis, *Storer*, Synops., p. 72.
 Drum, or Drum-fish, *Vulgo*.

DESCRIPTION. This very large fish is oblong, sub-ovate, thick and nearly straight at the belly, thin and much arched at the back. The head is large, slightly prominent between the eyes, and swollen at the sides ; the snout is full, rounded, and has a large, loose, pendent fold of skin, as in *Umbrina*, but uncleft ; within this is a shorter, thinner, and narrower fold ; in the larger fold are five pores ; the external on each side are elliptical, and much the largest ; above these is a semicircular row of eight or ten minute pores.

The eye is large, the pupil deep sea-blue, and the iris of a light golden-grey colour. The nostrils are double ; the posterior is oval, large, and directed downwards and forwards from the middle to the inferior plane of the orbit ; the anterior is much smaller, round, midway between the orbit and snout, and about the lower plane of the orbit.

The mouth is moderately large, with lips tolerably thick and fleshy ; the upper jaw is very protractile, longer than the lower, which is received within it ; both are armed with several series of short, small, conical, sharp-pointed, closely-set teeth ; those of the lower jaw are rather smallest. The tongue is very large, thick, fleshy, rounded in front, and tied down to its tip. The palate is smooth ;

but the middle pharyngeal bones are armed with remarkably large teeth, which bear a close resemblance to rounded and projecting paving-stones; while the anterior and posterior pharyngeal have small and card-like teeth. From the chin and lower jaw descend numerous barbels; those at the chin are smallest, and clustered together, but a single row of larger barbels runs along the inferior face of the lower jaw. There are five large pores near the chin; the three internal are placed among the barbels, the two external are without.

The pre-opercle is rounded at its angle, and slightly so at its posterior margin; it is covered with large scales in front, is smooth behind, and has neither spine nor serrated margin. The opercle is large, and terminates posteriorly in two rounded and flattened processes covered with skin, which projects backward in a loose fold. The gill-openings are large; there are seven branchial rays.

The dorsal fin is deeply emarginate, and but slightly elevated; it begins a little behind the origin of the pectoral, and has in its anterior portion ten large, compressed, ensiform spines, of which the anterior is short, scarcely projecting above the skin; the second and third are longest, and the two last are nearly horizontal; these spines are partially received in a groove of scales; the posterior portion of the dorsal is longer, but less elevated, and has one spine and twenty-two soft rays. The pectoral begins at the opercle, and is large, broad, semi-falciform, thick at its root, pointed behind, and has seventeen rays.

The ventral fin is shorter than the pectoral, and begins rather behind its origin; it is thick at its root, and has one strong spinous, and five soft rays. The anal is large, and has two spines, partially received in a groove, the anterior very short, and the posterior large and long; it has seven soft rays, the first long, and the last short, so as to make the extremity of the fin vertical. The caudal is large, strong, nearly square, and has seventeen rays.

The scales are large, sub-quadrate, rounded behind, where the margin is soft and ciliated, very thick in the middle, whence radiating striæ run to the rad-

ical portion, and cross concentric and parallel lines; between these diverging lines are others that are shorter; they are closely adherent. The lateral line is nearly concurrent with the outline of the back, and its scales are smaller than those of the body, and deeply emarginate behind; each has a tube beginning about its anterior third, and subdividing behind.

COLOUR. The body is dull silvery, or lead colour, more or less bright, and often with a coppery tint; sometimes the body above is bluish-black, or very rarely there are obscure dusky bars; the barbels are always white; the membrane of the dorsal fin is dusky-olive, with numerous minute dots, and here and there lighter shades of dirty white; the pectoral is dirty white, with numerous dusky dots, especially on its membrane, which gives the whole a bluish-black tint, with a dusky blotch at its base; the anal is dusky, relieved with clouded white.

DIMENSIONS. The head is one fourth the entire length of the animal; its greatest elevation without the dorsal fin is equal to nearly one head and a quarter; total length, four feet.

SPLANCHNOLOGY. The liver is very large, and in colour like that of the ox; its transverse portion is thin in the middle, but is thicker on the sides, and is again contracted at its place of union with the lobes; the left lobe is shorter, or about half as long as the right, and is partially subdivided above, one portion going to the hypochondrium and the other to a depression between the first and second ribs; the right lobe is larger, and extends three fourths the length of the abdominal cavity, and is greatly contracted behind the gall-bladder; its inferior border is sharp, and its intercostal and hypochondriac portions are more developed than those of the left lobe. The gall-bladder is large, oblong, sub-pyriform, with thin walls, and is partially lodged in a fossa on the left face of the right lobe. The œsophagus is large, with numerous folds on its inner face, and strong, longitudinal muscular fibres without. The stomach is not much broader than the œsophagus; it is elongated, sub-cylindrical, rather pointed behind, and extends about two thirds the length of the abdomen; it is folded within, and has its longitudinal fibres well developed; the pyloric branch is broad, but exceedingly short, and begins near the cardia; there is an evident pyloric contraction, and seven or eight finger-like cœcal appendages, all nearly of the same calibre, but varying somewhat in length. The small intestine appears at first sight larger than the undistended stomach, but with thinner walls; it gradually becomes smaller, and runs backwards, with numerous short convolutions, for

two thirds the abdominal cavity, and is then reflected to the pylorus, where it is concealed by the cæcal appendages, whence it returns to end in the rectum, which is more capacious, has thinner walls, and no rectal valve. The spleen is large, and of a very dark purple colour.

The air-bladder is one of the most curious of its organs; it is large and long, nearly the entire length of the abdomen, rather sub-ovate, larger, rounded, and free behind, smaller and closely adherent to the anterior part of the vertebral column before; from each anterior corner, both right and left, proceeds forwards to a pit in front of the first rib a short *cornu*, with its outer margin festooned; if this be examined from within, it will be seen that there is but one canal by which it communicates with the general cavity of the air-bladder, and that the festoons are but so many tubes from this small horn; behind this is placed a lateral horn, which is much more capacious; it runs outwards and upwards through an opening between the first and second ribs, and is then lodged in a large cavity, which extends on the outside of the ribs as far as the fourth; this has also a festooned border, and if opened there will be seen six or seven canals leading from the cavity of the air-bladder to the cavity of this great horn, and that all along the festooned border are tubes of greater or less extent. From the posterior of these tubes runs backwards along the side of the air-bladder a tube, which is pervious for some distance only, and is then continued to its posterior extremity as a fibrous chord. The air-bladder both above and below has a white, satin-like appearance, with transverse fibres; below and on each side along its posterior half are thick, strong, transverse muscular fibres; these do not meet in the middle, but leave a space of two inches or more, where the proper coats of the air-bladder are exposed; internally, it exhibits a most beautiful satin-like appearance, with numerous blotches of vascular spots, and with distinct longitudinal white fibres. The testicles, when empty, are narrow, flattened, with sharp margins, and extend from the third rib to near the vent before they unite. The kidneys are large in front, on each side the spine, but gradually become smaller, and terminate at about the seventh rib; behind this is another separate and unconnected lobe, much thicker, shaped like a chestnut, and partially marked with a median groove below, and of a much redder brown.

HABITS. The *Pogonias cromis*, though an inhabitant of our waters throughout the year, is only taken abundantly in April, which is its spawning season. At this time the *Drum* enters the different bays and inlets of salt water along the shores of South Carolina, to deposit its spawn, and then begins its drumming noise; this season passed, the sound is no longer heard, and the fish is then rarely taken. Broad River or Port Royal Harbour, which is the deepest and most capacious bay along our whole southern coast, is a chosen place of resort for these animals, and great numbers are there annually taken. Mr. Elliot says as many as twelve thousand have been captured in one season. The way in which the singular sound

called drumming is produced has not hitherto been satisfactorily explained. Cuvier observes that it may depend upon the air-bladder, though he says it has no communication with the external atmosphere. DeKay supposes it "to be occasioned by the strong compression of the expanded pharyngeal teeth upon each other."

Frequent examinations of the structure and arrangement of the air-bladder, as well as observations on the living animal just taken from the water, when the sound is at intervals still continued, have satisfied me that it is made in the air-bladder itself; that the vibrations are produced by the air being forced by strong muscular contractions through a narrow opening, from one large cavity, that of the air-bladder, to another, the cavity of the lateral horn; and if the hands be placed on the sides of the animal, vibrations will be felt in the lateral horn, corresponding with each sound.

Ichthyologists differ also as to the character of the sound; Schoepff speaks of it as "a hollow, rumbling sound under water"; Dr. Mitchill, as a "drumming noise"; Dr. DeKay says, when the fish is "freshly taken from the water, it sounds as if two stones were rubbed together." It resembles most the tap of a drum, and is so loud, that, when multitudes of them are collected together, it can be heard in still weather several hundred yards from the water.

The *Drum* feeds on various molluscos and crustaceous animals; during the spawning season, in April, it takes the hook readily enough when baited with *prawns*, which also appear at that period; I have also always found the stomach filled with fragments of *Scutellæ*.

GEOGRAPHICAL DISTRIBUTION. The *Pogonias cromis* ranges along our coast from New York to Cape Florida.

GENERAL REMARKS. Linnæus first described this fish, from a specimen sent him from Carolina by Dr. Garden, and probably a dried one, as no mention is

made of the remarkable barbels at the chin. He placed it in his genus *Labrus*, and gave it the specific name it still retains; but he confounded with it two other fishes of Marcgrave and of Brown, the first of which is, according to Cuvier and Valenciennes, an *Otolithus*, and the other an *Umbrina*.

POGONIAS FASCIATUS. — *Lacépède*.

Plate XVI. Fig. 1.

SPECIFIC CHARACTERS. Body silvery, with dusky vertical bars. D. 10 – 1 – 22. P. 17. V. 1 – 5. A. 2 – 7. C. 17.

SYNONYMES. *Pogonias fasciatus*, *Lacép.*, Hist. Nat. Poiss., tom. iv. p. 445.

Labrus gruniens, *Mitch.*, Trans. Lit. and Phil. Soc. N. Y., vol. i. p. 405, pl. 3, fig. 3.

Pogonias fasciatus, *Cuv. et Val.*, Hist. Nat. Poiss., tom. v. p. 210, pl. 118.

Pogonias fasciatus, *Wilson*, Ency. Brit. (Ichth.), p. 176, pl. 296, fig. 13.

Pogonias fasciatus, *DeKay*, Zoöl. N. Y., part iv. p. 81, pl. 14, fig. 40.

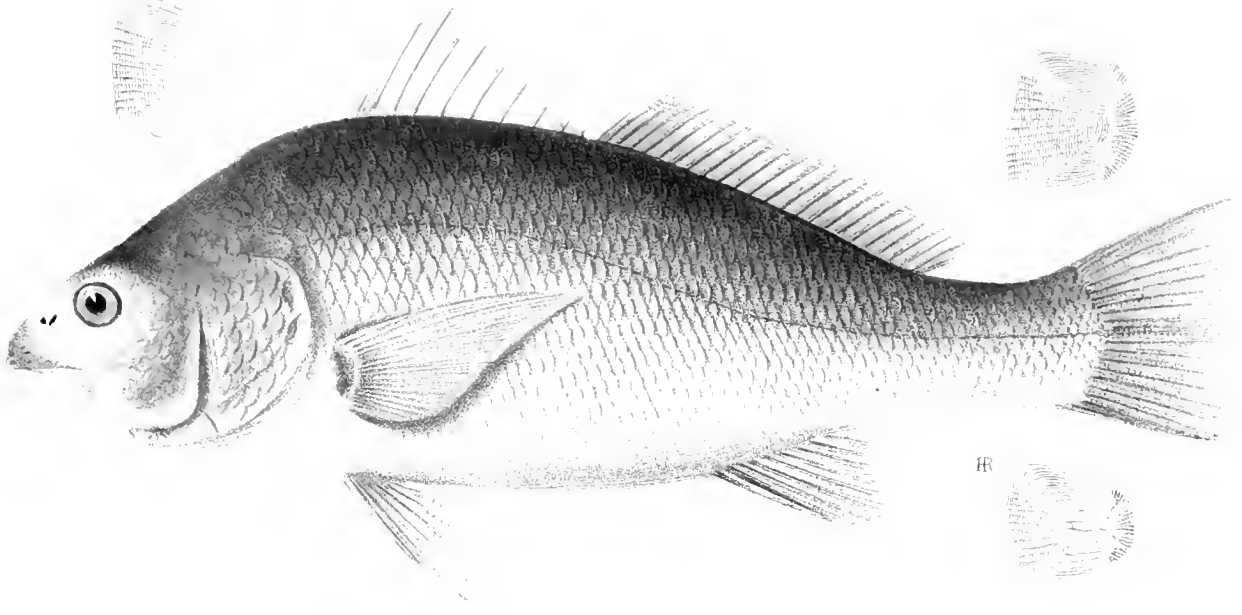
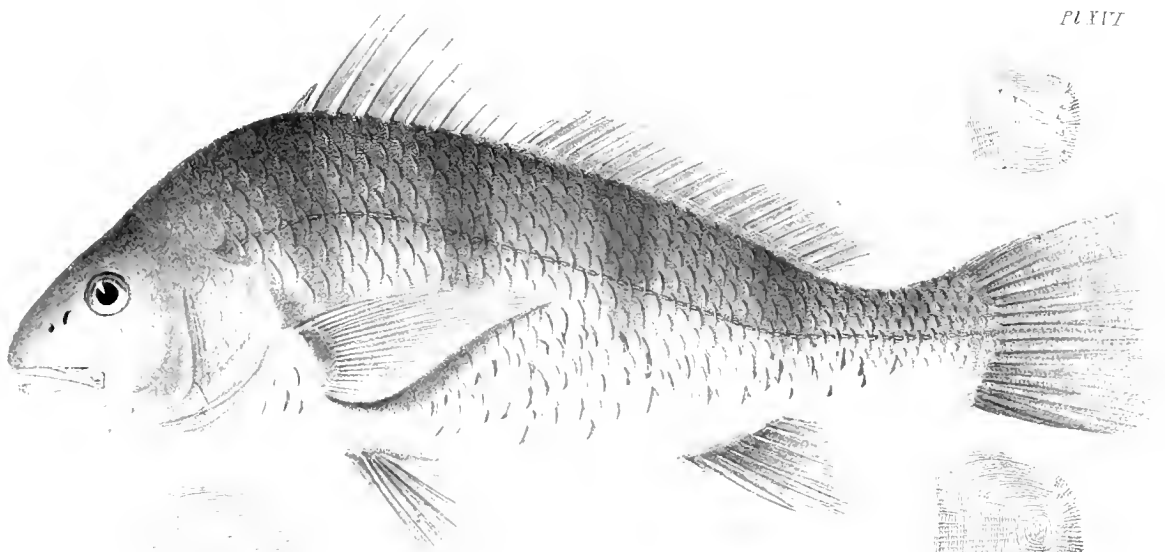
Pogonias fasciatus, *Storer*, Synops., p. 72.

Young Drum, *Vulgo*.

DESCRIPTION. This fish is so similar to the one last described, in form, as well as in its individual parts, that I shall only mention those points in which they differ most.

COLOUR. The ground colour of the whole animal is silvery, more or less shaded along the head and back above; the sides are marked with several vertical dusky bars, more or less distinct; the belly is white; the membrane of the dorsal fin is semi-transparent, and is studded with minute points of dusky blue; the spines are white, with fewer dusky spots; the soft portion is less transparent than the spinous, and has a bluish appearance, from the number of minute bluish-black dots, most so along its middle, as if marked with an indistinct band. The pectoral is semi-transparent, dusky on the anterior part of its upper face, and at its root; the

PLATE



ventral rays are white, but the membrane is more or less clouded, both above and below, with bluish-black ; the anal spines are dirty white ; the soft portion is white at its root, and more or less bluish-black in other parts.

DIMENSIONS. The length, from the opercle to the tip of the tail, is equal to three heads and a half ; the elevation without the dorsal fin, to one head and a half ; total length, two feet and a half.

SPLANCHNOLOGY. The liver is large ; the left lobe is of a sub-triangular form, and extends nearly as far back as the stomach ; the central or transverse portion is tolerably thick in its middle, and is well bounded by a fissure between both right and left lobes ; the right lobe is as large in front as the left, but behind the gall-bladder it becomes smaller, three-sided, and extends to near the vent. The gall-bladder is large, olive-shaped, and extends to about the posterior half of the right lobe. The stomach is small, and does not reach half the length of the abdomen ; its walls are thick ; its pyloric branch goes off near the cardia, and has a well-marked pyloric contraction ; there are six cæcal appendages almost as long as the stomach. The spleen is large, sub-triangular, rather flat, and connected with the stomach, but not extending behind it. The air-bladder has its lateral horns less developed than in the last species, and there is no fibrous chord pervious for a short distance running backwards from the posterior channel between the body and lateral horns ; but there are several small pits in its posterior part.

HABITS. The *Young Drum*, though subsisting on the same animals as the *Pogonias cromis*, differs from it considerably in its habits, as it is taken with the hook at nearly all seasons of the year ; yet the largest are captured in November and December.

GEOGRAPHICAL DISTRIBUTION. The *Pogonias fasciatus* ranges along the Atlantic coast from Rhode Island to Cape Florida.

GENERAL REMARKS. Lacépède published the first account of this fish, but the description was furnished by Bosc, who observed it in our State, where he was for some time a resident, and who did much to elucidate its zoölogy.

GENUS HÆMULON. — *Cuvier*.

CHARACTERS. Head compressed; profile lengthened; lower jaw long, compressed, and generally red at its posterior half; chin with an oval cavity and two pores; back arched; dorsal fin single, slightly emarginate, soft portion scaly; ventral fins covered with scales; branchial rays seven.

HÆMULON CHRYSOPTERON. — *Linnaeus*.

Plate XVII. Fig. 1.

SPECIFIC CHARACTERS. Head large; snout prolonged, compressed; mouth large, narrow, red behind; back arched, pale grey; belly silvery; ventral fin yellowish. B. 7. D. 13–14. P. 17. V. 1–5. A. 3–10. C. 18.

SYNONYMES. Margate-fish, *Cates.*, Hist. Carol., &c., vol. ii. p. 2, pl. 1, fig. 1.
Perca chrysoptera, *Lin.*, Syst. Nat., tom. i. p. 488.
Perca chrysoptera, *Gmel.*, Ed. Syst. Nat., tom. i. pars iii. p. 1314.
Lutjan chrysoptère, *Lacép.*, tom. iv. p. 126.
Hæmulon chrysopteron, *Cur. et Val.*, Hist. Nat. Poiss., tom. v. p. 240.
Hemulon chrysopteron, *DeKay*, Zoöl. N. Y., part iv. p. 85, pl. 7, fig. 22.
Hæmulon chrysopteron, *Storer*, Synops., p. 74.
 Red-mouth Grunt, *Vulgo*.

DESCRIPTION. The body is elongated, much compressed, sharp and arched along the back, broader and nearly straight below.

The head is very large, long, compressed at the sides, narrower below, broad and flat between the eyes, with the snout rather pointed. The eye is very large, and midway between the extremities of the opercle and snout, but with its lower

margin above the median plane of the head. The nostrils are double, nearer to the orbit than to the snout; both are sub-oval, and the posterior is rather above the median plane of the eye. The mouth is capacious in the longitudinal direction, but is much compressed and narrow in the transverse, with lips tolerably thick and fleshy. The upper jaw is longer than the lower, and receives its teeth when the mouth is closed. Both are armed with a single row of pointed, rather long, conical teeth; those of the lower jaw are largest behind, those of the upper are largest in front, and slightly incurved; behind this row in each jaw is a broad patch of minute, villiform teeth, closely crowded together, and extending about one fourth the length of the lower jaw, and rather more than a fourth in the upper. The pharyngeal teeth are small, conical, pointed, and directed backwards. The tongue is small, pointed in front, and but slightly movable.

The pre-opercle is large, with its angle round, and its ascending border nearly vertical, slightly emarginate, and beautifully serrated. The opercle is nearly sub-triangular, rounded behind, with its base upwards, and is separated from the pre-opercle below by the inter-opercle. The whole head, except the lips and space between the nostrils and snout, is covered with scales. The gill-openings are rather contracted; there are seven branchial rays. The suprascapular is rounded behind, rather small, but strongly serrated, and from it ascend two or three series of small scales, which mark the separation of the head from the body.

The dorsal fin is single; it begins with the root of the pectoral, and has thirteen spines, the first short, the fourth, fifth, and sixth more or less compressed and curved; the others are straight, and all are partially received in a groove of scales; there are fourteen soft rays, covered for some distance with scales. The pectoral is thin, rather long, but it ends before the vent, and has seventeen rays. The ventral fin arises back of the root of the pectoral, and terminates with it behind; it has one spine and five soft rays, the anterior ending in a short filament. The anal begins opposite the third dorsal soft ray, and has three spines received in a groove; the anterior is very short, and the others three times as long,

though they are not much thicker; it has ten soft rays covered with scales, like the dorsal fin. The caudal is very large, bifurcate, and has eighteen rays, more or less covered with minute scales.

The scales are rather large, and nearly semicircular; the diameter is in front, and marked with ten radiating striæ; the circumference is behind, beautifully and finely ciliated. The lateral line runs nearly straight, and not quite concurrent with the back, and at the posterior portion of the dorsal fin it descends to the median plane.

COLOUR. The whole animal, when first taken from the water, is bright and silvery; but it soon becomes of a pale brown, with a slight brazen tint along the back and sides, though the belly remains white; the upper jaw within is white; the palate is salmon-colour; the lower jaw and mouth below are also white in their anterior third; the posterior two thirds both within and without are red, and the mouth below, tongue, and fauces, are of a similar colour; the dorsal fin at its anterior part is semi-transparent, the posterior is more dusky; the pectoral is transparent; and the ventral yellowish on its anterior, and white on its posterior half.

DIMENSIONS. The length, from the opercle to the tip of the tail, is equal to two heads and a fourth; the elevation, to one head and a sixteenth; total length, twelve inches.

SPLANCHNOLOGY. The peritoneum is black. The liver is small, and consists of two lobes, with an exceedingly thin transverse portion; the left lobe is twice as long, and more than twice as thick, as the right, and both are irregularly three-sided. The gall-bladder is sub-pyriform, and attached to the right lobe, though it extends behind it. The stomach is rather small, elongated, sub-conical, pointed behind, and has tolerably thick walls; the pyloric branch is short, though nearly as broad as the stomach, from which it departs near its middle, and has a very remarkable contraction at the pylorus. The small intestine runs at first about half the length of the abdomen; it then returns to the pylorus to be reflected and end in the rectum, which is more capacious, but has thinner walls, and a well-developed rectal valve. There are ten delicate, slender cæcal appendages,

of variable length, some being nearly two inches long. The air-bladder is large, pointed behind, with a cornu on each side in front, that runs forward near the œsophagus; its lining membrane is of a greyish colour. The kidneys are broad before, and terminate about the posterior fifth of the abdomen; but the ureters are continued, and end in a small, short, sub-pyriform bladder.

HABITS. The *Red-mouth Grunt* is occasionally taken in our waters at all seasons of the year, but is never abundant, as seldom more than two or three are met with at a time in market; it is not esteemed as food, as its flesh lacks both firmness and flavour.

GEOGRAPHICAL DISTRIBUTION. The *Hæmulon chrysopteron* is found along our coast from New York to the Gulf of Mexico, but I am not aware of its existence in the Gulf itself.

GENERAL REMARKS. Catesby gave the first description and figure of this animal; the figure is one of the best in his work, so far as regards form, and the red mouth is well marked. The description, too, though short, is characteristic: — "This fish has a rounding back, making a curved line between the head and tail; the mouth is moderately wide and red within; the upper mandible hanging a little over the lower, and both of them have a single row of small, sharp teeth."

HÆMULON ARCUATUM. — Valenciennes.

Plate XVII. Fig. 2.

SPECIFIC CHARACTERS. Body elevated, compressed, brown above, with a pale cupreous tint, sides lighter; scales with a bright gilded spot; head dusky above, and marked at the sides with horizontal lines of ultramarine blue; posterior half of the lower lip red. D. 12–17. P. 16. V. 1–5. A. 3–9. C. 20.

SYNONYMES. *Hæmulon arcuatum*, *Cuv. et Val.*, Hist. Nat. Poiss., tom. ix. p. 481.

Hemulon arcuatum, *DeKay*, Zööl. N. Y., part iv. p. 87.

Hæmulon arcuatum, *Storer*, Synops., p. 76.

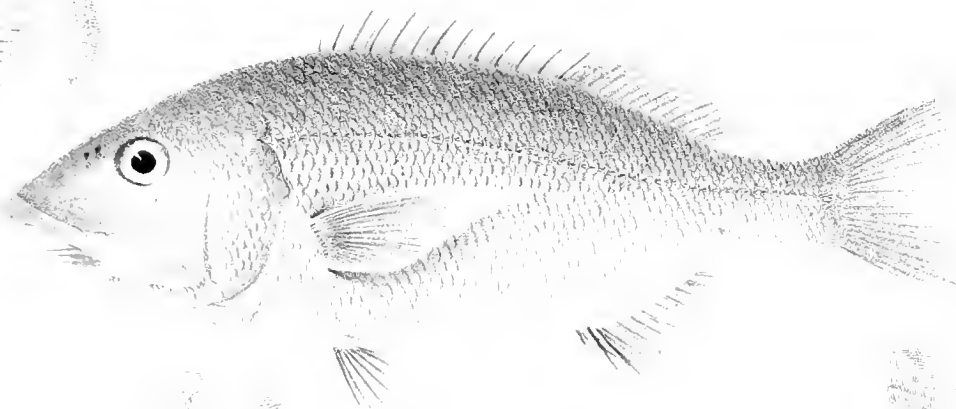
Black Grunt, *Vulgo*.

DESCRIPTION. The head is very large, compressed, elevated, with the facial outline incurved, and the snout projecting and rounded; the body is sub-oval, compressed, nearly straight at the belly, arched at the back, and thin. The eye is large, the pupil dusky, and the iris golden, mixed with grey; it is placed one diameter and a half of the orbit from the posterior border of the opercle, and two and a half from the snout, and is considerably above the median plane. The nostrils are double; the posterior and larger is sub-round, and longest in the longitudinal direction; the anterior is round, nearer to the orbit than to the snout, and both are above the median plane of the eye, and on a line within the orbit.

The mouth is very large, though compressed, and extending nearly to the orbits; the lips are very thick and fleshy; the upper jaw is protractile, and the inter-maxillary bone is of great size; the lower jaw is large, and rounded at the symphysis, with three pores near the chin, of which the posterior is largest. Both jaws are armed with numerous villiform teeth; the outer row in each is much the larger; the teeth in this row are conical, pointed, and those in front are recurved. The tongue is smooth, thin, rounded in front, free, movable, and short, as it does not extend half the length of the lower jaw. The pharyngeal bones are armed with teeth somewhat similar in form to those of the outer row of the jaws; but they are shorter, stouter, less pointed, and some have their apices much rounded, especially in the lower pharyngeal bones.

The pre-opercle is rounded at its angle, with its ascending border nearly perpendicular, slightly emarginate at its centre, and finely serrated. The opercle is narrow, rounded behind, and terminates in two obtuse, flattened points, from which a short fold of skin projects backwards. The sub-opercle is large. The opercle is covered with large, and the pre-opercle with small scales, which extend to the anterior inferior part of the orbit; the head above is covered with small scales to the

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margin of the orbit, whence it is smooth to the snout. The gill-openings are large; there are seven branchial rays, of which the three last are delicate. The supra-scapular is rather small, semicircular behind, and strongly serrated.

There is a single dorsal fin, large, emarginate, and beginning with the pectoral, just behind the gill-openings; it has in its anterior half twelve spines, the first very short, the fourth, fifth, and sixth longest; they are all more or less compressed, and partially received in a groove; the posterior half has one spine, and seventeen soft rays, covered with large scales at their roots, and minute scales to near their tips. The pectoral is rather broad and short, though it extends farther back than the ventral; it has sixteen rays, and a slight scaly fold in the axilla above. The ventral is large, broad, and terminates in front of the vent; it has one spinous and five soft rays, with a large triangular fold in the axilla. The anal is large, broad, and has three spines, the first minute, the second of great size, and the third as long as the second, though not half as stout; there are nine soft rays, the first and second longest; the spines are partially received in a groove, and the soft portion is covered with scales, like the dorsal. The caudal is large, strong, forked, and has twenty rays, covered with large scales at their roots, and with smaller scales to near their tips.

The scales are large, finely ciliated behind; there are fifteen in the vertical direction, and fifty in the longitudinal. The lateral line corresponds with the margin of the back to the posterior extremity of the dorsal fin, when it descends to the median plane, and thus continues, and is marked by two or three radiating striæ on each scale.

DIMENSIONS. The head is one third the length of the entire animal; the greatest elevation without the dorsal fin is one head; total length, ten inches.

COLOUR. The head is dusky above, but the sides are marked with horizontal lines of ultramarine blue; there is a red blotch at the angle of the mouth, which extends along the lower lip for some distance; the body is olive-brown above, and

of paler colour at the sides, and each scale is marked with a gilded spot; the dorsal fin is semi-transparent, with dusky shades; the soft dorsal, ventral, pectoral, and anal fins have a bluish tint, more or less evident.

SPLANCHNOLOGY. The peritoneum is dusky, or even black in places. The liver is large, and may almost be said to consist of but two lobes, so small is their transverse or communicating portion; the left lobe is large, broad, flat, extends two thirds the length of the abdomen, and has its upper and lower margins thin and sharp; it sends forward one large process, above and behind the cornu of the air-bladder, and another small process or lobe extends into a small cavity in front of the cornu; the right lobe, though smaller and thinner than the left, is longer, and extends nearly to the vent; it is sub-triquetrous in form, its superior margin being rounded; it has a small prolongation in front of the cornu of the air-bladder, and one behind it, as in the right lobe, only it is less developed; near the posterior third of the belly the lobe becomes flattened, with sharp margins, and has sometimes a fold, like an additional lobe. The gall-bladder is elongated, sub-pyriform, with a long cystic duct, which is finely reticulated on its inner surface. The stomach is rather small, narrow, sub-oval, less in size than the œsophagus, and pointed behind; its walls are tolerably thick, and its mucous membrane has numerous longitudinal folds, which are, however, not permanent; its pyloric branch is short, and goes off near the cardia; there is a remarkable pyloric contraction. The small intestine is of rather large calibre, but has thin walls, and its mucous membrane is beautifully reticulated; it runs at first backwards for two thirds the length of the abdomen; it is then reflected to the base of the pylorus, whence it returns to end in the rectum, which is long, and has a well-developed rectal valve; its walls are thicker than those of the small intestine; and its mucous membrane is more reticulated than that of the large intestine generally. There are seven slender cœcal appendages, but of unequal length, as some are short, and others are longer than the stomach. The spleen is short, oblong, tolerably thick along its mesial line, but with its margins compressed and thin. The air-bladder is large, oblong, broad in front, where there is a short projection forwards in its middle, and two equally short horns on each side; it is pointed behind, and adheres firmly to the bodies of the vertebræ in front. The testicles are large, sub-triangular, and long, extending even in the unfilled state more than half the length of the abdomen. The kidneys are small, flat, and widely separated before to allow the air-bladder space to be in contact with the vertebral column; yet they unite and terminate about the posterior fourth of the abdomen; the urinary bladder is very large, oblong, and has thick walls.

HABITS. But little more is known of the habits of the *Black Grunt*, than that it lives in the deepest waters, and that fragments of shells and portions of smaller fishes are often found in its stomach.

GEOGRAPHICAL DISTRIBUTION. As yet this fish has been observed only on the coast of South Carolina, and is even there but seldom seen.

GENERAL REMARKS. This animal was first described by Cuvier and Valenciennes, and from specimens procured in South Carolina; it is closely allied with the *Hæmulon formosum*, but its facial outline is more incurved, and there are no ultramarine lines on the occipital bones.

GENUS OTOLITHUS. — *Cuvier*.

CHARACTERS. Upper jaw armed with canine teeth; lower jaw without barbels, or pores, or with pores exceedingly minute; dorsal fins two, separated; anal spines feeble; air-bladder with a slender cornu projecting forwards on each side of its anterior part.

REMARKS. This genus was established by Cuvier, and is well characterized by its canine teeth, which distinguish it from *Sciæna*, on the one hand, and from *Corvina* and *Leiostomus*, on the other. It includes many species, inhabitants of the Indian Ocean, as well as of the Atlantic shores of America; and it is remarkable that those of the Old World have canine teeth in both jaws, while those of America have them only in the upper.

OTOLITHUS REGALIS. — *Schneider*.

Plate XVIII. Fig. 1.

SPECIFIC CHARACTERS. Body above pale brown, with a strong greenish tint, and marked with irregular dusky blotches; belly silvery; ventral and anal fins yellowish; upper jaw with a double series of small, conical, sharp-pointed teeth,

and between these rows two canine teeth in front; lower jaw with a single row of similar small teeth behind, and a double series before. D. 9-1-29. P. 16. V. 1-5. A. 1-13. C. 17.

SYNONYMES. *Johnius regalis*, *Schneid.*, Ed. Bloch, Ichth., p. 75.

Weak-fish, *Schoepff*, Schrift. der Gesells. Nat. Freund., b. viii. st. 2, p. 169.

Roccus comes, *Mitch.*, Report in part, p. 26.

Labrus squeteague, *Mitch.*, Trans. Lit. and Phil. Soc. N. Y., vol. i. p. 396, pl. 2, fig. 6.

Otolithus regalis, *Cur. et Val.*, Hist. Nat. Poiss., tom. v. p. 67.

Sciæna regalis, *Rich.*, Faun. Bor. Amer. (Ichth.), p. 68.

Otolithus regalis, *Storer*, Report, &c., p. 33.

Otolithus regalis, *DeKay*, Zoöl. N. Y., part iv. p. 71, pl. 8, fig. 24.

Otolithus regalis, *Storer*, Synops., p. 66.

Salt-water Trout, *Vulgo*.

DESCRIPTION. The form of this fish is elongated, slightly elevated, rather compressed, thicker above than below. The head is rather broad behind, but narrow at the snout. The eye is large, elongated, with a black pupil and golden-grey iris; it is placed one diameter and a quarter of the orbit from the snout, and with its inferior margin at the median plane of the head. The nostrils are double; the posterior is a large, narrow, elliptical, vertical fissure; the anterior is much smaller and round, and both are in a sub-triangular depression below the supra-orbital ridge.

The mouth is large, as the upper jaw extends to the middle of the orbit, and the lips are thin. The upper jaw is rather short, rounded in front, protractile, and armed with a double series of conical, sharp-pointed teeth, the anterior of which are a little the largest; in front and between these rows are two canine teeth, large, pointed, directed backwards, and recurved; sometimes one or even both of these teeth are broken off at their roots. The lower jaw is longer than the upper, narrower in front, and armed behind with a single series of conical, sharp-pointed teeth, and a double series of smaller teeth in front. The tongue is large, broad, smooth, very free, and slightly emarginate at its tip.

The pre-opercle is round and prolonged at its angle, with its ascending border directed rather forward, and crenated or fringed, but without serratures. The opercle terminates behind in two flat and pointed processes, hardly perceptible in the recent specimens, but evident enough to the touch; from the inferior of these the skin is continued backward, and ends in a point. The sub-opercle is long and narrow. The inter-opercle is broad, and with a rounded outline below. The opercle and pre-opercle, as well as the head above, to near the extremity of the snout, are covered with scales, but the jaws are smooth. The gill-openings are large; there are seven branchial rays. The supra-scapular bone is large, semi-circular, but not serrated.

The anterior dorsal fin begins behind the origin of the ventral; it has nine feeble spinous rays, the second and third longest, and the posterior very minute; the soft portion has one spinous and twenty-seven soft rays. The pectoral is small and short; it arises just behind the opercle, is furnished above with a sub-triangular fold of scaly skin, and has seventeen rays, the anterior very stiff or sub-spinous. The ventral fin is stout; it arises behind the root of the pectoral, extends as far back, and has one spinous and five soft rays. The anal is of moderate size, and begins nearly opposite the fifteenth soft dorsal ray, and terminates behind with that fin; it has one large spinous and ten soft rays, the second, third, and fourth longest, and the posterior very short. The caudal is rather large, sub-crescentic, and has seventeen rays, and is covered with scales to near its extremity.

The scales are transparent, slightly adherent, about sixty-six in the longitudinal direction, and twenty-two in the vertical; their shape is unguiform, with the anterior margin straight, and with numerous minute striae, the posterior rounded and minutely ciliated. The lateral line runs nearly straight, along the superior fourth of the back, to the ninth dorsal spine, and then gradually curves down to the median plane, and is thus continued nearly to the tip of the caudal fin; its scale is small, sub-round, and with a large duct.

COLOUR. The ground colour of the whole animal is silvery, more or less clouded above, and with a strong green tint along the top of the head and back; the sides of the head are silvery; the back above the lateral line is marked with numerous irregular dusky blotches, less distinct beneath, and which finally disappear and leave the belly silver-white. The tongue above, and the inner and posterior part of the lower lip, are yellow; the roof of the mouth and fauces are of the same tint, but paler. The dorsal fin is transparent, or occasionally slightly clouded. The pectoral is semi-transparent, yellowish before and whitish behind. The ventral has its four anterior rays yellow, the posterior are white; the anterior half of the anal is yellow, with occasional minute dusky spots; its posterior half is pale yellow or white. The caudal is pale brown.

DIMENSIONS. The head, from the tip of the lower jaw, is one fourth of the entire length; the greatest elevation with the dorsal fin is one head; total length, twenty inches.

SPLANCHNOLOGY. The liver is large, the central portion rather narrow; the two lobes are long, narrow, the left being the longer, as it extends half the length of the abdomen, and both project into the hypochondria along with the horns of the air-bladder. The gall-bladder is elongated, conical, and situated far behind the right lobe; the cystic duct is long and slender, but is slightly enlarged opposite the right lobe, though it receives no hepatic duct at that point, but farther forward it receives several, and then opens into the duodenum. The stomach is long, narrow, pointed behind, and has thick walls; the pyloric portion is exceedingly short, and begins as far forwards as the transverse portion of the liver. The small intestine is nearly as large as the stomach, but with thin walls; it first turns backward nearly to the middle of the abdomen, where it makes a short convolution forward, and then is reflected to end in the rectum, which is much smaller. There are four cæcal appendages, conical, elongated, almost as large as the intestine, and some of them being nearly two inches in length. The ovaries are flattened, oblong, and are united behind to open into a common duct. The air-bladder is large, and extends the length of the abdomen; it is pointed behind, and terminates before in a small rounded extremity, with a conical pointed cornu on each side that projects slightly beyond it. These cornua separate from the air-bladder at about its anterior fourth, whence a groove is continued on its inner face nearly to its posterior extremity. The air-bladder has very thick walls, though by no means strong; they are of a white satin-colour without, but within and below is a large mass of greyish vascular matter. The kidney is rather broad, but thin along the spine; there is no urinary bladder.

HABITS. The *Otolithus regalis* is found in the waters of South Carolina throughout the year, but is most abundant and of the largest size in the autumnal months. It lives always in salt water, never ascending fresh streams, and feeds on various kinds of smaller fish, and is very voracious; it is taken with the hook or with the seine; but, though abundant in our market, it is not held in much estimation as food, its flesh being soft and without flavour.

GEOGRAPHICAL DISTRIBUTION. The range of this fish along the coast of the United States is very extended, as Dr. Storer has observed it as far north as Massachusetts, and Lesneur as far south and west as New Orleans.

GENERAL REMARKS. Schoepff gave the first description of this animal, and it is a very good one; he says it is called *Weak-fish* in New York, and *Scup* or *Scuppaug* in Rhode Island; yet he does not refer it to any of the genera established at that period.

Schneider, in his edition of Bloch, arranged it in the genus *Johnius*, and with the specific name *regalis*; but his description is less full and satisfactory than that of Schoepff, from which it is taken.

Dr. Mitchill's account of our animal is next in order, and is very good; but being unacquainted with the works of Schoepff and Schneider, he considered it an undescribed species, and called it *Labrus squeteague*.

Cuvier and Valenciennes have given the fullest and most accurate account of this animal that has hitherto appeared.

OTOLITHUS THALASSINUS. — *Holbrook.**Plate XVIII. Fig. 2.*

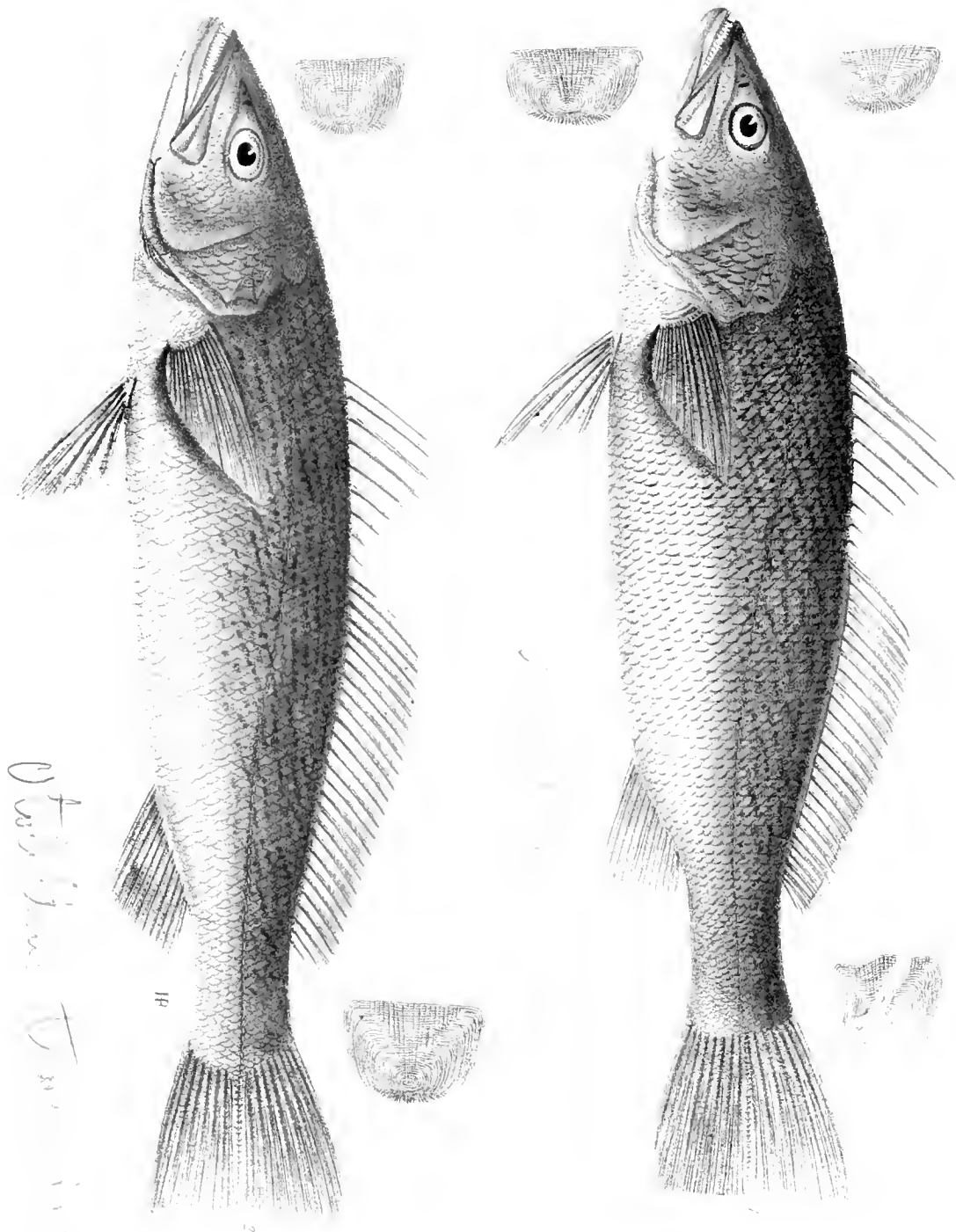
SPECIFIC CHARACTERS. Body elongated, slender, dusky, with a greenish tint above; sides and belly yellow. D. 10-1-26. P. 17. V. 1-5. A. 1-10. C. 17.

SYNONYME. Sea Trout, or Deep-water Trout, *Vulgo.*

REMARKS. Although this animal resembles greatly the one last described, yet it differs from it in the following particulars. It is much longer and less elevated in proportion; it is always of a yellow colour at the sides and belly; it has one dorsal spine more, and three soft rays less; the anal fin has three rays less; the fleshy appendix to the opercle is rounded; the snout is more pointed; the liver is smaller, and of a paler colour; the gall-bladder is cylindrical, with numerous convolutions, and in the specimen examined did not extend beyond the right lobe of the liver. In the character and disposition of its teeth, in its splanchnology, in its intestines, air-bladder, &c., it agrees perfectly with the *Otolithus regalis*.

HABITS. The *Otolithus thalassinus* differs from the last-described animal entirely in its habits, as it is only found in the ocean and in deep water, and never approaches the bays and inlets along the coast. It is also a larger animal.

GEOGRAPHICAL DISTRIBUTION. The few specimens that I have seen were all taken off Charleston bar, at about twenty miles from land, and in fifteen or twenty fathoms of water.



OTOLITHUS CAROLINENSIS. — *Valenciennes*.

Plate XIX. Fig. 2.

SPECIFIC CHARACTERS. Body above palest blue, with silvery reflections; sides silvery; belly white; caudal and dorsal fins, and sides above the lateral line, with numerous round dark spots. D. 10-1-26. P. 15. V. 1-5. A. 1-11. C. 17.

SYNONYMES. *Otolithus Carolinensis*, *Cur. et Val.*, Hist. Nat. Poiss., tom. ix. p. 475.
Otolithus Carolinensis, *DeKay*, Zoöl. N. Y., part iv. p. 72.
Otolithus Carolinensis, *Storer*, Synops., p. 66.
Salmon Trout, *Vulgo*.

DESCRIPTION. This beautiful animal is at once distinguished from all others of its genus by its colour, and the numerous dark spots with which it is ornamented. These spots are found mostly above the lateral line, some few only are below it; black spots exist also in both dorsal fins and in the caudal, but they are not so round and circumscribed as those on the body. Besides its colour, this *Otolithus* differs from the *Otolithus regalis* in having its head slightly less elevated, and its dorsal outline a little more arched; its snout, too, is narrower, though round, and its lower jaw is rather more prolonged; its caudal fin is slightly longest in its median plane, and is sub-crescentic both above and below it; and its ventral fins extend nearly half their length behind the pectorals.

HABITS. This fish is of the same size with the *Otolithus regalis*, with which it is always found, and is similar in its habits and is taken with the same bait.

GEOGRAPHICAL DISTRIBUTION. This animal is found along our Atlantic coast, from Carolina to the Capes of the Delaware; but I am ignorant of its extreme limits, north or south.

GENERAL REMARKS. This fish was first described by Valenciennes, and from specimens taken in South Carolina.

OTOLITHUS NOTHUS. — *Holbrook.*

Plate XIX. Fig. 1.

SPECIFIC CHARACTERS. Head and body silvery-white, or but slightly shaded above. D. 8-1-28. P. 16. V. 1-5. A. 1-9. C. 18.

SYNONYME. Bastard Trout, *Vulgo.*

DESCRIPTION. The form of this *Otolithus* differs from that last described in being shorter and thicker in proportion, and more arched along the back; the head, too, is smaller, the snout shorter, and the lower jaw more pointed. The eye is very large, and is less than its diameter from the snout; the pupil is deep blue, and the iris golden-grey. The nostrils are double; the posterior and larger is oval, elongated, nearly vertical, and on a plane rather below the upper margin of the eye, and at the anterior extremity of the supra-orbital ridge; the anterior is circular, small, and very near the posterior.

The mouth is large, with thin lips; the upper jaw is very protractile, and armed with a double series of small, conical, pointed teeth; in front, and between these rows, but belonging to neither, though nearest the posterior, are two large canine teeth, conical, pointed, recurved, and directed backwards. The lower jaw has a double series of minute, pointed teeth in front, while behind there is only a single row, and the teeth are larger. The tongue is large, flat, free in front, and rounded. The pre-opercle is rounded at its angle; its ascending border runs rather forwards, and both have a crenated margin. The opercle terminates in two minute, flattened points, between which is extended backwards a rounded portion of skin. There are seven branchial rays. The supra-scapular is large and semicircular.



The anterior dorsal fin begins behind the root of the pectoral, and has eight spinous rays partially received in a sheath, the second and third being longest. The posterior dorsal has one spinous and twenty-eight soft rays, the first very short and closely joined to the second; the scales ascend high up on its roots, and make a partial sheath. The pectoral is small; it arises at the termination of the opercle, extends almost as far back as the ventral, and has sixteen rays. The ventral is short, but tolerably broad; it begins behind the root of the pectoral, and has one spinous and five soft rays. The anal is short; it arises nearly opposite the sixteenth dorsal ray, and has one delicate spinous and ten soft rays, the first, second, and third longest. The caudal is moderately broad, nearly straight behind, and has eighteen rays, those of the middle rather longest.

The scales are soft, sub-quadrilateral, and slightly rounded behind, but are so arranged on the body as to appear sub-rhomboidal. The lateral line runs along the upper fourth of the body as far as the second dorsal, when it curves down to the median plane, and thus continues to the end.

COLOUR. The whole animal is silvery-white externally, except the fins; the pectoral being white, tinted with yellow on its outer margin; the anal yellow in front, and white or semi-transparent on its posterior half; the dorsal is transparent. The tongue is yellowish above; the roof of the mouth, and the inner face of the upper and lower jaws, are also yellow, but of a paler tint.

DIMENSIONS. The head is one fourth the entire length; the elevation without the dorsal fin is equal to one head; total length, twelve inches.

SPLANCHNOLOGY. The liver is composed of two lobes, and a small central or transverse portion, separated from the right lobe by a deep fissure; the right lobe is narrow, thin, and pointed behind, and extends about half the length of the abdomen; the left is much longer, and of sub-triangular form, and both project forwards into the hypochondria. The gall-bladder is cylindrical, and but little larger than the cystic duct, and is placed almost entirely behind the right lobe. The stomach is small, less in size than the œsophagus; it is cylindrical, rather pointed

behind, and has thick muscular walls; its pyloric branch is short, small, about half as broad as the stomach, from which it departs nearly at a right angle; there are four cæcal appendages, rather small, and all nearly of the same size. The small intestine runs, with slight flexures, to end in the rectum, which is less capacious. The ovaries are very long and slender, and unite far back. The air-bladder is similar to that of *Otolithus regalis*, but is rather more pointed behind.

HABITS. It is an uncommon fish on our shores, and, of course, little is known of its habits.

GEOGRAPHICAL DISTRIBUTION. As yet the *Otolithus nothus* has been observed only on the coast of South Carolina.

GENUS UMBRINA. — Cuvier.

CHARACTERS. A single barbel at the lower jaw; maxillary and inter-maxillary teeth card-like, and arranged in broad bands; dorsal fins contiguous; branchial rays seven.

REMARKS. This genus was established by Cuvier, who at first referred to it but few species, though it now includes many.

UMBRINA ALBURNUS. — Linnaeus.

Plate XX. Fig. 2.

SPECIFIC CHARACTERS. Body silvery, with several oblique, dusky bars above; silvery-white below; outer series of upper maxillary teeth largest, and rather distant from each other. D. 10-1-26. P. 20. V. 1-5. A. 1-8. C. 18.

- SYNONYMES. *Alburnus Americanus*, *Cates.*, Carolina, &c., vol. ii. p. 12, pl. 12, fig. 2.
Perca alburnus, *Lin.*, Syst. Nat., tom. i. p. 482.
Perca alburnus, *Gmel.*, Ed. Syst. Nat., tom. iii. p. 1311.
Perca-Whiting, *Schoepff*, Schrift. der Gesells. Nat. Freund., b. viii. p. 162.
Perca alburnus, *Shaw*, Gen. Zoöl., vol. iv. p. 548.
Umbrina alburnus, *Cur. et Val.*, Hist. Nat. Poiss., tom. v. p. 180.
Umbrina alburnus, *DeKay*, Zoöl. N. Y., part iv. p. 78, non pl. 7, fig. 20.
Umbrina alburnus, *Storer*, Synops., p. 71.
 Whiting, *Vulgo*.

DESCRIPTION. The form of this fish is very graceful; elongated, with the back slightly arched, and the belly nearly straight. The head is large, thick, prominent above; the snout full, rounded, and prolonged beyond the upper jaw; on its inferior margin is a broad, fleshy fold, thick, entire, adherent above, thin and subdivided into four smaller sub-quadrilateral, movable lobes below; of these, the two outer are rather longer, and each has a deep pore at its base; another large pore, of sub-rhomboidal form, exists near the middle of the extremity of the snout.

The eye is large, longest horizontally, and placed two diameters of the orbit from the snout, and three and three quarters from the posterior angle of the opercle, with its inferior margin above the median plane of the head; the pupil is deep sea-blue, the iris golden or flame colour. The anterior nostril is small, sub-round, with a movable curtain, and placed midway between the eye and snout; the posterior is very large, long, and elliptical; it begins below the orbit, and is directed upwards and backwards.

The mouth is inferior, of moderate size, and parabolic in front; the upper jaw is very protractile, and armed with several series of small, card-like, conical, sharp teeth, which are directed a little backwards. On the outer side of these, and at some distance from each other, is a row of much larger teeth, about fourteen in number, the largest of which are in front. The lower jaw is shorter than the upper, and received within it, so as to leave the outer and larger teeth of the latter

exposed ; it is armed in like manner, but wants the external row of larger teeth. The tongue is large, smooth, thick, fleshy, round, and free in front. The vomer and palate-bones are without teeth ; but the pharyngeals are studded at intervals with rather stout, conical, sharp-pointed, recurved teeth. At the chin is a short, stout, conical barbel, truncated at its apex ; it is moved by a delicate muscle on each side, which arises from the lower jaw, and is inserted by a minute tendon into the base of the barbel, and is supplied by twigs of the fifth pair of nerves. On each side of the barbel are two pores.

The pre-opercle has its angle rounded, and is without denticulations ; the opercle is rather broad, and terminates posteriorly in two flat points ; the whole head, pre-opercle, and opercle are covered with scales, those on the latter bone being largest. There are seven branchial rays, but the two upper are compressed and concealed by the opercle, and the two inferior are so small that they can only be well seen after dissection.

The dorsal fin begins opposite the origin of the ventral, and terminates before the root of the caudal ; its anterior portion has ten spines, of which the anterior is so short as to be seen only on close examination, while the second, third, and fourth are very long, the third most so of all ; the second portion of the dorsal has one delicate spine and twenty-six soft rays. The pectoral fin is large, strong, broad, and rounded posteriorly ; it arises in front of the dorsal, and terminates opposite its soft portion, and has twenty rays, with an elongated triangular fold of skin covered with scales in the axilla. The ventral fin is short, broad, thin ; it begins about the anterior fourth of the pectoral, but does not extend as far back, and has one spine and five soft rays, with a small, loose fold of skin in the axilla above. The anal is small, and arises opposite the twelfth dorsal soft ray, and has but one spine and eight soft rays, of which the third, fourth, and fifth are longest. The caudal fin is short, sub-crescentic, the upper horn thinner and smaller, though of equal length.

The scales are sub-quadrilateral in form, a little longest in the antero-posterior

direction; they are ciliated at their posterior margin, and become rough when dry. The lateral line is concurrent with the outline of the back, and is placed at first about the upper third of the body, but towards the tail it descends to the middle; its scale is oblong, larger and ciliated behind, with its duct nearly in the middle, and bifurcating posteriorly.

COLOUR. The colour is silvery, a little clouded on the back, and marked with several oblique, irregular, dusky bars, running from the back to below the lateral line, when they disappear and leave the belly silvery-white; sometimes these bars are interrupted, and they then appear as irregular blotches; the fins are all more or less translucent, and without spots.

DIMENSIONS. The length from the opercle to the extremity of the tail is rather more than three heads; the elevation of the body is more than three fourths of the head. Whitings are sometimes caught sixteen inches long.

SPLANCHNOLOGY. The stomach is large, and extends to within an inch of the vent; it is sub-conical in form, pointed behind, with thick walls, and numerous folds on its inner face, which are, however, removed by distention. The pyloric portion begins near its anterior fourth, is small and very short, with the pyloric contraction well marked externally. The duodenum is at first larger than the pyloric portion of the stomach, though with walls much thinner. There are seven cæcal appendages, all about an inch long, and all nearly of the same size. The small intestine runs to the posterior extremity of the stomach, is then reflected to the pylorus, whence it again turns back to end in the rectum, which has thinner walls, though it is more capacious and with an evident rectal valve. The liver is large, both lobes nearly of the same size in front, where both project into the hypochondriac regions, but the left is longer, reaching to the extremity of the stomach; the central or transverse portion is also very thick, and is continuous with the left lobe without a fissure. The gall-bladder is long, cylindrical, with thin walls, and extends more than half its length behind the right lobe of the liver, to which it is attached by peritoneal folds. The spleen is long, narrow, sub-triangular. The ovaries are bilobed, or double in front, but unite into one far back, and open above and behind the rectum in a common canal. The ureters terminate in a small, short bladder, which is placed far back, and a little to the right side. There is no air-bladder.

HABITS. The *Whiting* remains with us all the year round, and although few are taken in December and January, yet they are sufficient to prove its constant residence near Charleston. In the spring and summer months they are very abundant; they enter the mouths of bays and rivers, and are captured in great numbers. They take the hook readily; their favorite bait is the shrimp, and, being a strong, lively, active animal, they afford much sport to the fisherman. They prefer deep and running waters, and seldom approach so near the shore as to be taken in seines. Their ordinary food seems to be various species of smaller fish, shell-fish, &c.

GEOGRAPHICAL DISTRIBUTION. The *Umbrina alburnus* inhabits the Southern waters, from Cape Fear in North Carolina to Cape Florida.

GENERAL REMARKS. The first notice of this animal occurs in Catesby's History of Carolina, &c., where it is called *Alburnus Americanus*, or *Carolina Whiting*; his description is short, very imperfect, and the figure accompanying it hardly to be recognized, as it represents a portion of the posterior dorsal fin closed, so as to make it appear altogether wanting.

Linnaeus, in his *Systema Naturæ*, gives a much better description of it, from recent specimens furnished him by Dr. Garden, an accurate naturalist, and at that time a resident of Charleston. Linnaeus, however, does not mention the barbel at the chin, one of its most important generic characters, but describes it as a Perch, *Perca alburnus*, which specific name has ever since been applied to it by succeeding ichthyologists.

The history of this fish, really so simple, has been made a little complicated by some naturalists, who have confounded it with a Northern animal, a different species, the *Umbrina nebulosa* of Mitchill.

Schoepff, a German naturalist, and surgeon to one of the Hessian regiments during the war of the Revolution, resided for some time on Long Island and in

New York, and published an excellent memoir on the fishes of that neighbourhood in a Berlin journal.* He described a fish under the name of *Whiting*, and his description is good, even to the barbel at the chin; but he errs in supposing it to be more abundant along the shores of Carolina and Florida, and still more in supposing it to be identical with the *Perca alburnus* of Linnæus.

Dr. Mitchill's account of Schoepff's animal is next in order, and may be seen in the Transactions of the Literary and Philosophical Society of New York. His description, at least so far as regards the external forms, is accurate, and is accompanied by a tolerably good figure; but unacquainted with the memoir of Schoepff, which is exceedingly rare in this country, he supposed it to be an undescribed species, and called it *Sciæna nebulosa*, which specific name has the right of priority.

Some years subsequently, Cuvier and Valenciennes, in their great work, *Histoire Naturelle des Poissons*, gave so full and accurate an account of this animal, as to leave nothing to be desired; but they committed the same mistake as Schoepff, in describing it as identical with the *Perca* (*Umbrina*) *alburnus* of Linnæus, or *Whiting* of Carolina. That their description was taken from the *Umbrina nebulosa*, and not our animal, is evident from the description itself; thus they say,—"The first dorsal has its third ray prolonged in a long point, which surpasses by one third the elevation of the body beneath it";† which is never the case in the Carolina *Whiting*.

Dr. Storer, in his excellent Report on the Fishes of Massachusetts, receives at first the King-fish as a distinct species, *Umbrina nebulosa* of Mitchill, or *Whiting* of Schoepff; but in his Synopsis of North American Fishes, he follows the example of Cuvier and Valenciennes in supposing the *Umbrina nebulosa* and *Umbrina alburnus* to be identical.

* Schriften von der Gesellschaft Naturforschender Freunde, zu Berlin.

† "La première dorsale a son troisième rayon prolongé en une pointe qui surpasse d'un tiers la hauteur du corps au-dessous d'elle."

Dr. DeKay, in the ichthyological part of his Fauna of New York, gives a good figure of the animal, in which the long ray of the dorsal fin is well marked; but he also adopts the opinion of Cuvier and Valenciennes. Nor is this so remarkable; for neither Dr. Storer nor Dr. DeKay had ever seen the Southern animal, or *Umbrina alburnus*, at the time their works were published.

It seems, then, that these two fishes, the *Umbrina alburnus* and *Umbrina nebulosa*, though nearly allied, and closely resembling each other at first sight, are really not only specifically distinct, but have an entirely different geographical distribution; the one is a Southern animal, the other is peculiar to the North; the one is never found north of Cape Hatteras, nor the other, so far as I know, south of it.

UMBRINA LITTORALIS. — *Holbrook*.

Plate XX. Fig. 1.

SPECIFIC CHARACTERS. Body silvery-white, immaculate; outer row of large separated teeth in the upper jaw wanting. D. 10-1-27. V. 1-5. A. 1-9. P. 18.

SYNONYME. Surf Whiting.

DESCRIPTION. The general forms of this fish are so precisely the same as those of the *Umbrina alburnus* as to need no description, the snout only being a little more full and rounded in front. It is, therefore, only necessary to notice the particular characters in which it differs from the other, or those that constitute it a distinct species.

I. The *Umbrina littoralis* has teeth similar to those of the *Umbrina alburnus*, but the outer, larger, and separated row is wanting.



II. The tongue is about half the size, placed far back, and is slightly movable at the tip.

III. The stomach is smaller, cylindrical, pointed behind, and shorter, not extending more than half the length of the abdominal cavity.

IV. There are ten cæcal appendages, which are longer than those in the *Umbrina alburnus*.

V. The gall-bladder is pyriform, and placed entirely behind the right lobe of the liver, without being attached to it.

VI. The urinary bladder is a long tube, placed on the right side of the rectum.

VII. The colour is silvery-white, iridescent along the back when first taken out of the water.

VIII. The dimensions are the same, except in the ventral fin, which terminates with the pectoral.

HABITS. This species of *Umbrina* makes its appearance on the coast of Carolina in the month of April, and continues with us during the entire summer, though very few are taken in July and August. It is only found in shoal water, where the bottom is hard or sandy, often forming, when the tide is out, an extensive beach. Its favourite resort is in the neighbourhood of the shore, where the surf can roll over it from the ocean, and bring with it, doubtless, the animals on which it feeds. In such localities many are captured with the seine, and are sold in market under the name of *Surf Whiting*, in contradistinction to the *Umbrina alburnus*, which is called the *Deep-water Whiting*. Its food seems to be similar to that of the *Umbrina alburnus*, judging from the contents of the stomach, and yet it is seldom taken with the hook.

GEOGRAPHICAL DISTRIBUTION. Hitherto I have only seen this fish in the immediate neighbourhood of Charleston.

GENERAL REMARKS. This fish is very commonly supposed to be the adult female of the *Umbrina alburnus*, or common *Whiting*, approaching shoal water to deposit its spawn, and from common report I believed it to be such, until frequent dissections proved to me that there are both males and females among them. The flesh of this species is good, but by no means as finely flavoured as that of the *Umbrina alburnus*.

GENUS MICROPOGON. — *Cuvier*.

CHARACTERS. General form of an *Umbrina*; several minute barbels at the chin; pre-opercle dentated, with teeth smaller above, and long, separated, pointed teeth, almost spinous, at the angle; membrane at the snout above the upper jaw with four lobes; mouth inferior; jaws armed with small, equal, villiform teeth; five pores at the chin; branchial rays seven.

GENERAL REMARKS. This is another genus established by Cuvier, and is closely allied on one side with *Pogonias*, and on the other with *Corvina*; it may, however, be readily distinguished from the former by the exceeding minuteness of its barbels, and from the latter by their actual presence, however minute. This genus includes at present but three well-determined species, which are limited to the Atlantic coast of America, and of these only one has been observed in the waters of South Carolina, though it doubtless ranges along the coast of Georgia and North Carolina, south of Cape Fear.

MICROPOGON UNDULATUS. — *Linnæus*.*Plate XXI. Fig. 1.*

SPECIFIC CHARACTERS. Head large; snout rounded, full, prominent, and from its inferior part, over the upper jaw, hangs a fold, as in *Umbrina*, which is partially subdivided into lobes, the external longest and pointed; mouth inferior; barbels at the chin minute; three large and two small pores near the extremity of the lower jaw; body silvery, slightly shaded above, and marked with numerous minute dusky spots. D. 10 – 1 – 27. P. 14. V. 1 – 5. A. 2 – 8. C. 17.

SYNONYMES. *Perca undulata*, *Lin.*, Syst. Nat., tom. i. p. 483.

Croker, *Cates.*, Carolina, vol. ii. p. 3, tab. 3, fig. 1.

Perca undulata, *Gmel.*, Syst. Nat., tom. i. pars iii. p. 1312.

Le Sciène Croker, *Lacép.*, Hist. Nat. Poiss., tom. iv. p. 184.

Micropogon undulatus, *Cuv. et Val.*, Hist. Nat. Poiss., tom. v. p. 219.

Micropogon undulatus, *DeKay*, Zoöl. N. Y., part iv. p. 84.

Micropogon undulatus, *Storer*, Synops., p. 73.

Croker, *Vulgo*.

DESCRIPTION. This fish has almost the precise form of an *Umbrina*, though rather more arched in the back. The head is long, elevated posteriorly, with the snout full and rounded. The eyes are large, longest horizontally, near the facial outline, with the superciliary margin prominent, and covered with two or three series of small scales; the posterior margin of the orbit is equidistant between the snout and the posterior angle of the opercle; the pupil is very dark, the iris silvery, mixed with reddish-grey. The nostrils are double, the posterior very large, sub-oval, rather pointed behind, and directed downwards and forwards, to below the plane of the eye; the anterior is very small, round, and midway between the orbit and the snout.

The mouth is inferior, small, and does not open beyond the posterior nostril;

the lips are thin; the upper jaw is long and protractile; the lower is shorter, and received within the upper when the mouth is closed, so as to leave some of its teeth exposed. Both jaws are armed with rather broad bands of small, equal, villiform teeth. The middle pharyngeal bones are armed with larger teeth, sub-conical, rounded at their apices, and paved; in the others they are conical and pointed. The tongue is short, thick, narrow, and placed far back; the chin is furnished with four pairs of minute barbels, and is indented with five water-pores. The pre-opercle is serrated; the serratures are small above, but are separated, and so long at the angles as to resemble spines. The opercle terminates posteriorly in two long and flat points, and is covered with scales. The sub-opercle is long, narrow, and with a membranous prolongation behind. The inter-opercle is also long and narrow, but is rounded below. The gill-openings are large, and have seven branchial rays.

The dorsal fin is single, though deeply emarginate, as the membrane that unites the two portions is but slightly elevated; it arises behind the root of the ventral, and has in its anterior portion ten spines, the first of which is so short as to be seen with difficulty; the second part has one spine and twenty-seven soft rays, and is partially received in a groove of scales. The pectoral is broad, long, and ends in a point opposite the fifth dorsal ray. The ventral is broad, but short; it begins behind the root of the pectoral, and ends about its posterior fifth, and has one strong spine and five soft rays, the anterior of which ends in a short delicate filament. The anal is broad, and has two spines, the anterior minute, the posterior large and strong, with eight soft rays, the second and third longest; the other rays gradually decrease in length, and thus make the posterior extremity of the fin vertical. The caudal is rather long, and has seventeen rays.

The scales represent the half of a circle, the diameter before, the circumference behind, and finely ciliated; the radical margin with twelve rather long striae, the outer on each side largest. The lateral line is concurrent with the back, and its scales are smaller than those of the body, and marked with a tube that bifurcates behind.

COLOUR. The head is rather dusky above; the lower jaw and cheeks are white; the entire body is silvery, slightly shaded above, and marked with numerous and irregular dusky spots, in general disposed without order, though rarely they are confluent and represent interrupted lines; these dusky spots disappear below the plane of the pectoral fin, and leave the belly white. The spinous portion of the dorsal is semi-transparent above, while below there are two or three irregular series of dusky blotches in the membrane that unites the spines; the soft portion is semi-transparent above, but with several rows of dusky blotches below; that near the roots of the rays is very regular; the pectoral is transparent, being only dark at its root; the ventral is yellow on its outer part, and white on its inner; the spine of the anal is white; the four rays next to it are yellow, most so at their tips; the others are white or transparent.

DIMENSIONS. The distance between the opercle and the tip of the tail is equal to two heads and three quarters; the elevation is not quite a head in any one part; total length, fourteen inches.

SPLANCHNOLOGY. The liver is very small, though the transverse portion is thick and projecting; the left lobe is longest, and extends back about two thirds the length of the abdomen; the right is swollen in front, and is about half as long as the left; and both project into the hypochondria. The gall-bladder is large, elongated, cylindrical, and runs farther back than the lobe to which it is attached. The stomach is of moderate size, conical, with thick walls, and ends behind with the left lobe of the liver. The pyloric portion is small, short, separating from the stomach far forward and at right angles. There are six delicate cæcal appendages, nearly all of the same calibre, but varying much in length; some being nearly half as long as the stomach. The small intestine is large; it runs to the vent, thence returns to the beginning of the pyloric portion of the stomach, whence it is reflected to end in the rectum, which is smaller, but with much thicker walls and a very well developed rectal valve. The spleen is small, but elongated, flattened, and does not extend behind the stomach. The testicles are oblong, narrow, pointed in front, and unite in substance far behind. The air-bladder is large, broad, sub-round; it is largest in front, and tapers to a point behind; on each side, and a little anterior to its middle, arises a delicate, slender horn, which runs forward, and, having passed its anterior extremity, curves inward, so as nearly to meet its fellow at a considerable distance in front of the organ itself; there are muscular fibres on the inferior and posterior portion of the air-bladder. The kidney is broad before, but narrow along the middle of

the spine ; the ureters enlarge a little before their termination, but not enough to make a urinary bladder.

HABITS. The *Croker* first makes its appearance in deep water off Charleston in the month of May, but it only becomes common in shallow water in June and July, and is most abundant and of the largest size in October and November. It is not much esteemed as food, and is only used as a pan-fish.

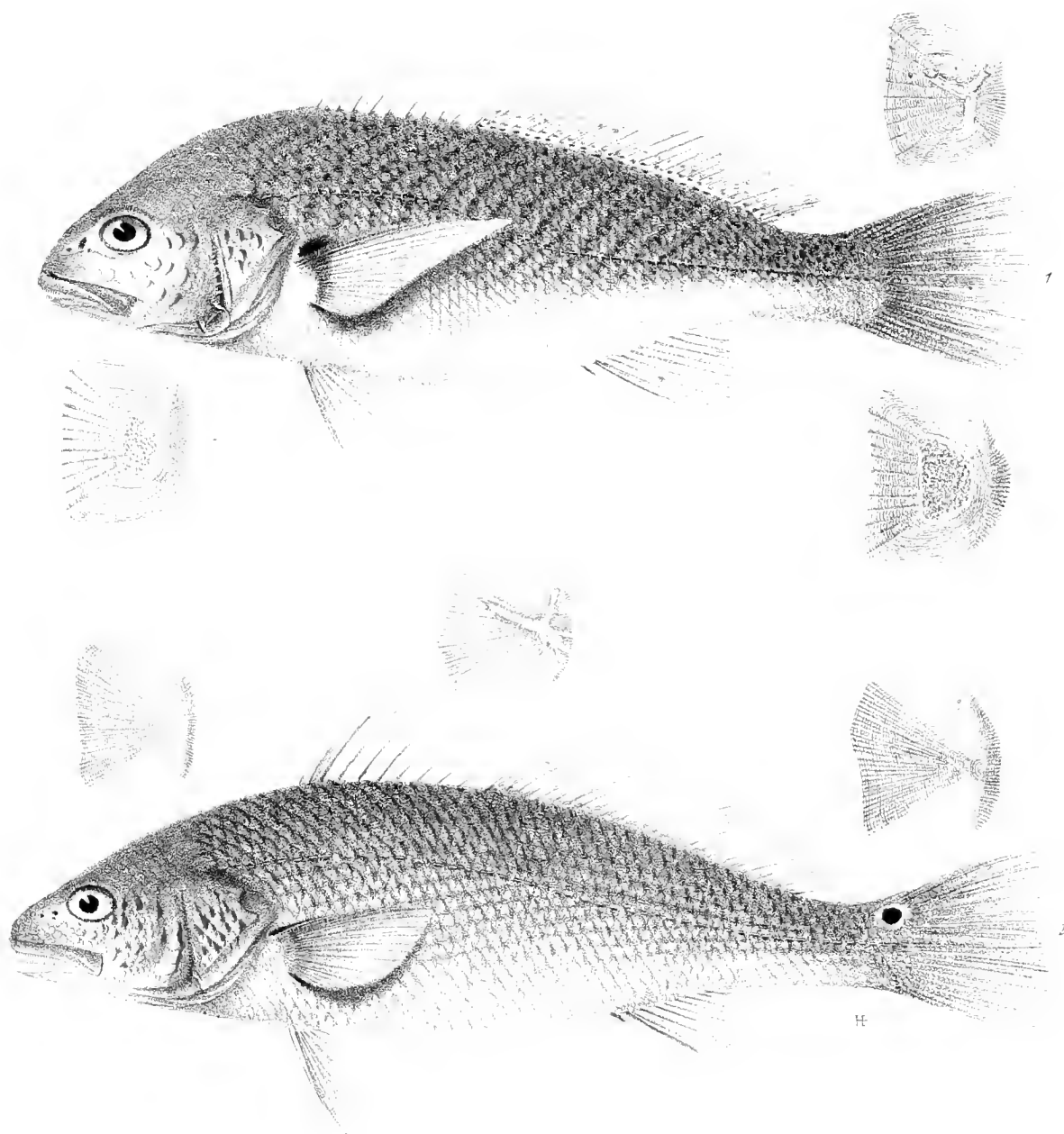
GEOGRAPHICAL DISTRIBUTION. The *Micropogon undulatus* is known to inhabit the waters of the United States, from Virginia to Lake Pontchartrain, near New Orleans.

GENERAL REMARKS. Catesby published the first figure of this fish in his Natural History of Carolina, as the *Croker*, and accompanied it by a very short and imperfect description. Linnæus afterwards described it more fully and accurately as *Perca undulata*, from a specimen sent him by Dr. Garden.

GENUS CORVINA. — *Cuvier*.

CHARACTERS. Head large, with the snout round and full ; no barbels at the chin ; teeth in both jaws numerous, small, villiform ; upper jaw with an outer row of large, conical, sharp-pointed teeth ; two dorsal fins, or one deeply emarginate ; anal spines, in some, moderate ; in others, robust ; pre-opercle serrated ; branchial rays seven.

REMARKS. This genus of *Sciænidae* was established by Cuvier, and is closely allied to *Umbrina* and *Pogonias*, though he says it may be distinguished from either of them by its want of barbels at the chin ; and from *Sciæna* by the size and extent of its anal spines, or from *Otolithus* by its want of canine teeth ; yet one of the characters that he assigns to *Corvina*, “an external row of larger,



pointed, *equal* teeth," does not exist in the only species that I have examined, the *Corvina ocellata*; for the teeth of this row are always largest in front, and decrease gradually in size towards the commissure of the mouth. This genus contains more than thirty-five known species, which are widely extended in both hemispheres, and are mostly inhabitants of salt water, though some few are found in fresh.

CORVINA OCELLATA. — *Linnaeus*.

Plate XXI. Fig. 2.

SPECIFIC CHARACTERS. Head large, snout round and projecting beyond the mouth; body elongated, slightly arched above, nearly straight below; silvery white, with a bluish tint along the back, and an oval or sub-round black spot, bordered with white, near the superior margin of the base of the caudal fin. D. 10 – 1 – 25. P. 17. V. 1 – 5. A. 2 – 7. C. 17.

SYNONYMES. *Perca ocellata*, *Lin.*, Syst. Nat., tom. i. p. 483.

Perca ocellata, *Gmel.*, Ed. Syst. Nat., tom. i. pars iii. p. 1313.

Centropome œillé, *Lacép.*, Hist. Nat. Poiss., tom. iv. p. 156.

Lutjan triangle, *Lacép.*, Hist. Nat. Poiss., tom. iv. p. 121.

Perca ocellata, *Shaw*, Gen. Zoöl., vol. iv. p. 550.

Sciæna imberbis, *Mitch.*, Trans. Lit. and Phil. Soc. N. Y., vol. i. p. 411.

Corvina ocellata, *Cuv. et Val.*, Hist. Nat. Poiss., tom. v. p. 134, pl. 108.

Corvina ocellata, *DeKay*, Zoöl. N. Y., part iv. p. 75, pl. 21, fig. 61.

Corvina ocellata, *Storer*, Synops., p. 67.

Bass, or Spotted Bass, *Vulgo*.

DESCRIPTION. The form of this fish is elongated, sub-round, slightly arched above, straight below, thicker along the back, and thinner at the belly. The head is large, and flattened above; the snout is rounded, full, and with a dependent fold of skin, partially subdivided into four lobes. The eyes are large, longest horizontally, and placed two diameters of the orbit from the snout, and nearly four diameters from the posterior angle of the opercle, with their lower margin above

the median plane of the head; the pupil is dusky, the iris silvery, mixed with reddish-grey. The nostrils are double, nearly on the same plane, and below the median plane of the eye; the posterior is larger, and both are round.

The mouth is inferior, large, and opens on a line vertical with the middle of the orbit; the upper lip is tolerably fleshy, and protractile; the lower is shorter than the upper, and received within it. The tongue is broad, flat, thick, placed far forward, rounded in front, with a very thin margin, and movable, as it has an extensive frænum. Both jaws are armed with a broad band of small, villiform, card-like teeth; but the upper has an additional external row of much larger teeth, which are conical, sharp-pointed, and curved backwards at their tips; they are about sixteen in number, and those in front are largest. The middle pharyngeal teeth are stout, rather short, conical, some with obtuse or rounded points, others almost flat; the marginal teeth of these bones are small and sharp-pointed.

The pre-opercle is rounded, and dentated at its angle, and finely serrated at its ascending border, which is nearly vertical. The opercle is rather short, and terminates posteriorly in two flat points. The gill-openings are large, and there are seven branchial rays.

The dorsal fin begins in a line with the origin of the pectoral, and terminates before the root of the caudal; it has ten spines; the anterior is very short, the second, third, and fourth are longest, and all are partially received in a groove formed of scales; the soft portion has twenty-six rays. The pectoral is small, narrow, with fourteen rays, and terminates in front of the ventral. The ventral begins behind the root of the pectoral, extends farther back, and has five rays. The anal fin is rather large, but does not reach as far back as the dorsal; it has two spines, the anterior exceedingly small and soft, the posterior large, long, and strong, with eight soft rays, which are covered nearly half way with scales. The caudal is large, nearly square, and has seventeen rays.

The lateral line is concurrent with the back, and is continued along the middle

of the caudal; the tube in its scale bifurcates in front, and radiates behind. The scales are very large, and are ciliated behind, and arranged in oblique rows.

COLOUR. The *Bass* is of a beautiful silvery colour and iridescent when first taken from the water, but soon becomes rather clouded along the back; there is a sub-round dark spot, margined with white or orange, at the superior part of the base of the caudal fin; sometimes there are several of these spots, as many as four or five, disposed in a horizontal row, but the spot at the root of the caudal is always present; the dorsal in its anterior half is semi-transparent, and made dusky by numerous minute dark points; its posterior half is still darker; the superior half of the pectoral is white, the inferior is tinted with yellow or orange; the ventral is white below, with its second or third anterior rays pale orange above; the anal spine is white, and the four or five rays next it are yellowish.

DIMENSIONS. There are three heads and a quarter from the opercle to the tip of the tail; its greatest elevation is equal to one head; the *Bass* is sometimes taken four feet in length.

SPLANCHNOLOGY. The liver is large, especially the transverse portion; both lobes are of nearly the same size in front, and full in the hypochondriac regions; but the right extends twice as far back, or about one half the abdomen. The gall-bladder is cylindrical, with very thin walls, and very long, as it extends far behind the right lobe, even nearly to the vent. The stomach is long and large, sub-oval when distended, with thin walls, and without folds in its mucous membrane; the pyloric portion is exceedingly short; it begins near the diaphragm, and has walls thicker than the stomach, and arches forward to terminate in the duodenum; there are eight cæcal appendages around the duodenum, all nearly of the same size at their roots, though they vary in length. The small intestine is large, and has very thin walls; it runs at first towards the diaphragm, then turns backwards for about three fourths of the abdominal cavity, whence it returns to the root of the pylorus, to be again reflected and terminate in the rectum. The spleen is large, sub-triangular, thickest in the middle, and is placed between the stomach and the first portion of the small intestine as it runs backwards. The air-bladder is long, large, full, rounded in front, pointed behind, and ends near the anal spine, and has a small slender horn on each side, that begins near its anterior extremity, and extends beyond it, to be reflected on itself for a short distance. Behind this horn is a large lateral sac, placed

in a deep depression between the four and five ribs that communicate with the general cavity by three or four small and short tubes. The testicles, when empty, are slender, very long, and unite far back into one. The urinary bladder is large, sub-pyriform, and placed rather on the left of the mesial line.

HABITS. The *Bass* appears with us early in March, and is then small, seldom exceeding twelve or fourteen inches in length; but as the season advances it is caught of much greater dimensions, especially in November and December, when it is most abundant and of largest size. It feeds on various other fish and on crustaceous animals, as shrimps, &c., and it is taken with the hook, seine, or spear; it is held in much estimation as food, though I think its flesh wants firmness and flavour.

GEOGRAPHICAL DISTRIBUTION. This fish inhabits the Atlantic waters from New York to Cape Florida, and thence it ranges along the northern shores of the Gulf of Mexico, and is even found as far west, according to Lesueur, as Lake Pontchartrain, near New Orleans.

GENERAL REMARKS. The *Bass* was first described by Linnæus, and from a specimen furnished him by Dr. Garden; he regarded it as a Perch, and applied to it the specific name *ocellata*, from the black spot surrounded with a light ring on the tail; a name so appropriate that it has been preserved by all succeeding naturalists. Lacépède alone described it under a different specific name, as the *Lutjan triangle*; but then he was not aware that it was the same fish as his *Centropome willé*, or *Perca ocellata* of Linnæus, but he regarded it as an undescribed species, and placed it in another genus; and, by some mistake, he says he found it among the drawings of Commerson, when in fact, according to Cuvier and Valenciennes, his description was taken from a drawing of Bosc, done in Carolina, and from a young *Bass*.

GENUS LARIMUS. — *Cuvier*.

CHARACTERS. Snout very short and blunt; pre-opercle with minute serratures; jaws armed with small, villiform teeth; no barbels at the chin; branchial rays seven.

LARIMUS FASCIATUS. — *Holbrook*.

Plate XXII. Fig. 1.

SPECIFIC CHARACTERS. Body above light grey; sides and belly silvery; sides marked with vertical dusky bars; snout very short and truncated. D. 10 – 1 – 24. P. 12. V. 1 – 5. A. 2 – 6. C. 16.

SYNONYME. Bull-head, *Vulgo*.

DESCRIPTION. This fish bears considerable resemblance to the *Leiostomus obliquus*, though its back is less arched, and it is much thicker in the transverse direction. The head is small, and the snout short and truncated, though round; it is broad between the eyes, and is everywhere covered with scales, except along the lower jaw. The eye is very large, prominent, near the facial outline, with its inferior margin above the median plane of the head; it is about half its diameter from the snout, and two diameters from the posterior border of the opercle; the pupil is dusky, rather longest in the vertical direction; the iris is pale silver-grey. The nostrils are placed in a depression very near the eye; both are sub-oval, though the anterior is rather smaller and more elevated.

The mouth is of moderate size, and opens downwards and backwards; the upper jaw is not protractile, or but slightly so; and the lower is pointed in front, though thick in the vertical direction, and appears, when the mouth is open, much

longer than the upper, though in fact they are nearly of the same length when the mouth is shut. Both jaws are armed with small, villiform teeth. The tongue is very short, rounded in front, tolerably thick and smooth. The pre-opercle is rounded at its angle, with its ascending border nearly perpendicular, and without spines or serratures. The opercle is sub-rhomboidal, prolonged below, and with its posterior margin ending in two flattened points, from which hangs a slight fold of skin. The inter-opercle is thin, narrow, and semicircular. The gill-openings are large; there are seven branchial rays; the superior are flat, and the inferior small.

There are two dorsal fins; the anterior begins behind the origin of the pectoral, and has ten delicate spinous rays, the anterior minute; they are partially received in a groove; the posterior dorsal has one spinous and twenty-four soft rays, nearly of the same length, except the two or three last; its membrane is covered for some distance with minute scales, and the whole fin stands in a groove of scales. The pectoral is broad, though pointed behind; it arises rather before the fleshy termination of the opercle, and has twelve rays. The ventral begins behind the root of the pectoral fin, and extends nearly as far back; it has one spinous and five soft rays. The anal is short, and has two spines; the anterior is minute, and the posterior stout; it has six soft rays. The caudal is short, but rather broad and rounded behind, with sixteen rays.

The scales are nearly semicircular, straight before, rounded and finely ciliated behind. The lateral line is placed at first about the upper third of the body, and is concurrent with the outline of the back to the fourteenth ray of the soft dorsal, when it descends to the median plane, and thus continues to the tip of the caudal fin; its scales are irregularly quadrilateral, straight before, with twelve radiating striæ, finely ciliated, and slightly cordate behind.

COLOUR. The superior part of the head is silver-grey, more or less clouded; the cheeks, lower jaw, opercle, and pre-opercle are silvery; the body above the lateral line is pale silver-grey; below it is silvery; the sides are marked with seven ver-

tical dusky bars, more or less distinct, and with margins more or less regular; these bars are most observable above the lateral line, though some of them descend nearly to the belly; the spinous portion of the dorsal fin is transparent, with the margin of its membrane a little clouded; the soft portion is more or less clouded; the pectoral is semi-transparent; its rays are of a light colour, and its membrane is slightly clouded; the ventral is clouded with dirty yellow at its anterior half, but its two last rays are white; the large spine of the anal is light-coloured; its four anterior soft rays are tinted with yellow, and its two posterior are white; the caudal is semi-transparent, slightly dusky with faint tints of yellow near its tip.

DIMENSIONS. The head is less than one fourth of the entire length of the animal; the greatest elevation, without the dorsal fin, is equal to one head and a half; total length, twelve inches.

SPLANCHNOLOGY. The peritoneum is of a silvery colour. The liver is small, very pale, and consists of two lobes, and a thin transverse or central portion; of the two lobes, the left is rather the larger and longer. The stomach is very small, scarcely an inch in length; it is sub-conical in shape, pointed behind, and has tolerably thick walls; the pyloric portion is small, short, and branches off from the stomach at its anterior fourth. The small intestine runs half way to the vent, and is then reflected nearly to the pylorus, whence it turns backwards to end in the rectum. There are twelve small, pointed cœcal appendages. The spleen is long, slender, though thicker in its middle than at its extremities. The air-bladder is very large, sub-pyriform, smallest and rather pointed behind.

HABITS. The *Larimus fasciatus*, though a very rare fish, is sometimes found in company with the *Otolithus regalis*, and is caught with the same bait.

GEOGRAPHICAL DISTRIBUTION. This fish has as yet been observed only in the waters of South Carolina.

GENERAL REMARKS. This animal bears a great resemblance to the *Larimus breviceps* of Cuvier and Valenciennes; but can always be distinguished from it by the broad, dusky vertical bars on the sides.

HEMULON FULVO-MACULATUM. — *Mitchill*.*Plate XXII. Fig. 2.*

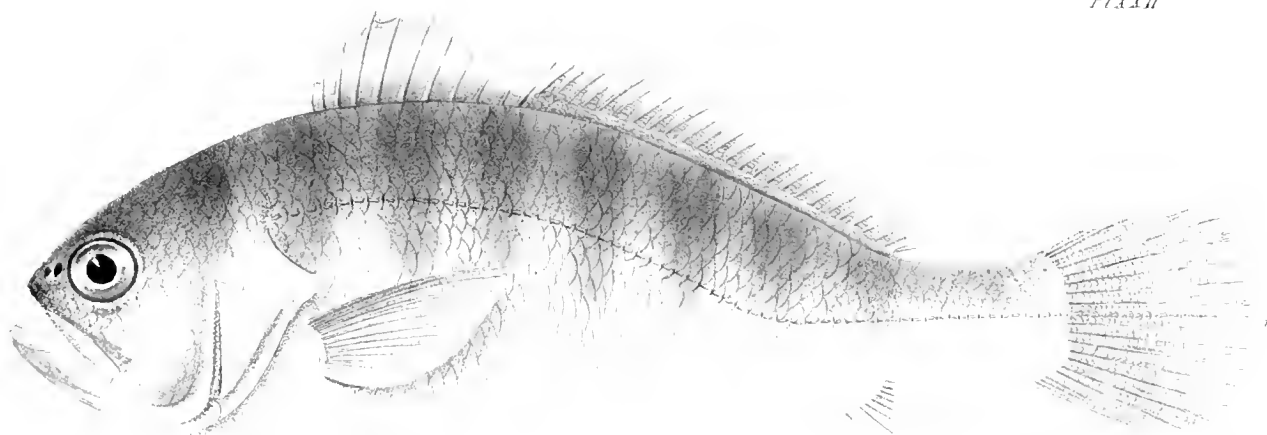
SPECIFIC CHARACTERS. Body above pale brown; belly silvery; sides marked with numerous orange-coloured or yellow spots, those above the lateral line disposed in irregular oblique lines, those below it in horizontal rows; dorsal, anal, and caudal fins with similar spots; sides of the head pale bluish, with a silvery tint, and marked with yellow spots; lower jaw orange at the angle of the mouth; internal surface of the gill-membrane bright orange. D. 11–15. P. 18. V. 1–5. A. 3–12. C. 17.

SYNONYMES. *Labrus fulvo-maculatus*, *Mitch.*, Lit. and Phil. Trans. N. Y., vol. i. p. 406.
Hemulon fulvo-maculatum, *DeKay*, Zoöl. N. Y., part iv. p. 84, pl. 7, fig. 21.
Hemulon fulvo-maculatum, *Storer*, Synops., p. 76.
Sailor's Choice, Hog-fish, *Vulgo*.

DESCRIPTION. The form of this fish is elongated, compressed, thin, and almost carinated at the back, which is much arched; thicker and nearly straight at the belly. The head is large, with the facial outline long and straight, or but slightly incurved above the eyes. The eye is of moderate size, longest in the horizontal direction, and is placed near the facial outline, with its inferior margin rather below the superior third of the head; it is nearly equidistant from the snout and the posterior margin of the opercle; the pupil is black, and the iris golden. The posterior nostril is round and small; the anterior is oblong, much the larger, and nearer to the orbit than to the snout; both are on a line within the orbit.

The mouth is sub-compressed and small, the posterior extremity of the upper jaw not reaching half way between the snout and nostrils. Both jaws are armed with a group of minute, rasp-like teeth. The pharyngeal bones have similar teeth, but slightly larger. The tongue is thin, flattened, sub-spatulate in form, and so short

PLATE II



as to extend only half the length of the mouth. The pre-opercle is very broad, smooth, with its angle slightly rounded, and its ascending border as slightly incurved just above the angle. The opercle is short, with its posterior angle obtuse, and has the sub-opercle intimately joined with it. The inter-opercle is semi-circular, broad, with two facets above for the opercle and sub-opercle. The gill-openings are large; there are seven branchial rays, with a loose fold of skin hanging from them behind.

The dorsal fin is single and long; its spinous portion begins rather before the end of the opercle, and has twelve spines received in a groove; its anterior spine is short, and the third is longest; the soft portion is elevated, with its base in a groove of scales; it has sixteen rays, of which the eleventh, twelfth, and thirteenth are longest. The pectoral is rather long and broad, though pointed behind; it begins near the opercle, ends at the vent, and has sixteen rays, with a fold of skin in the axilla above. The ventral arises behind the root of the pectoral, and does not extend as far back; it has one spinous and five soft rays. The anal is large, and has three spines placed in a groove, of which the anterior is smallest, and thirteen soft rays, situated in a groove, as in the dorsal. The caudal is large, crescentic, and has sixteen rays.

The scales are thin, four-sided, with ten radiating striæ, and a scalloped margin in front; round and finely ciliated behind. The lateral line follows nearly the outline of the back to the posterior extremity of the dorsal fin, when it descends to the median plane; its scales are small, sub-round, ciliated behind, and with their tube near the middle.

COLOUR. See *Specific Characters*.

DIMENSIONS. The head is rather more than one fourth of the entire length of the animal; the greatest elevation of the body, without the dorsal fin, is equal to one head and one fourth; total length, eleven inches.

SPLANCHNOLOGY. The peritoneum lining the walls of the abdomen is very dusky. The liver consists of two lobes united by a very thin transverse portion; the right lobe is more than twice as thick in front as the left, and extends about half the length of the abdomen; the left lobe is slender, and terminates in a point beyond the right. The stomach is long, narrow, cylindrical, and about three fourths as long as the abdominal cavity; its walls are not very thick, and there are numerous longitudinal folds on its mucous surface when it is undistended. The pyloric branch is very short, and departs from the stomach near its anterior extremity; there is a well-marked contraction at the pylorus. The small intestine runs half way to the vent, and is there reflected to the pylorus, whence it turns backwards to end in the rectum; which is long, though less capacious, and with thicker walls; the rectal valve is tolerably well marked. The inner face of the small intestine is beautifully reticulated in its whole extent; the same is true of the rectum, yet less evidently. There are six cœcal appendages, delicate and long; some of them are more than two inches in length. The spleen is long, narrow, flattened, though thick in the middle and thin at its extremities; it is of a very dark colour. The testicles are thin and sub-prismatic in form, resting on the air-bladder, and when empty extend half the length of the abdomen. The air-bladder is large, with tolerably thick walls, and extends the entire length of the abdomen; it is pointed behind, but broad before, and from its anterior extremity proceed forwards three slender horns, each about half an inch long, though the central one may be slightly the longest. The kidney is large and thick, but short; the urinary bladder is large.

HABITS. The *Sailor's Choice* makes its appearance in our waters about the month of April, and continues with us until November, when the largest are taken. I have found in the stomach of this animal only the fragments of smaller fish, and yet it takes the hook readily when baited with shrimps or clams.

GEOGRAPHICAL DISTRIBUTION. The *Hemulon fulvo-maculatum* is found along the coast from Georgia to Virginia, where it is called *Hog-Fish*, and is held in great estimation by epicures.

GENERAL REMARKS. This animal was first made known to naturalists by Dr. Mitchill.

GENUS LOBOTES. — *Cuvier*.

CHARACTERS. Snout short, profile incurved, lower jaw prolonged, with several groups of minute pores near its extremity; pre-opercle with strong serratures; dorsal and anal fins prolonged, and rounded behind; dorsal spines partially received in a furrow; branchial rays six.

LOBOTES SURINAMENSIS. — *Bloch*.

Plate XXIII. Fig. 2.

SPECIFIC CHARACTERS. Head short, profile incurved; pre-opercle strongly serrated, almost spinous at its angle; body elliptical, compressed, elevated, dusky or black above, with shades of yellow; dark silver-grey below. D. 12–16. P. 15. V. 1–5. A. 3–12. C. 17.

SYNONYMES. *Holocentrus Surinamensis*, *Bloch*, *Ichth.*, pars vii. p. 78, pl. 243.
Bodianus triurus, *Mitch.*, *Lit. and Phil. Trans.* N. Y., vol. i. p. 418, pl. 3, fig. 10.
Lobotes Surinamensis, *Cuv. et Val.*, *Hist. Nat. Poiss.*, tom. v. p. 319.
Lobotes Surinamensis, *DeKay*, *Zoöl.* N. Y., part iv. p. 88, pl. 18, fig. 49.
Lobotes Surinamensis, *Storer*, *Synops.*, p. 78.
Black Perch, *Vulgo*.

DESCRIPTION. The form of this fish is sub-oval, elevated, compressed, a little thicker at the belly than along the margin of the back. The head is rather short and compressed, the snout rounded, and the profile incurved. The eye is of moderate size, the pupil is black, and the iris grey, intermixed with yellow; it is placed about its diameter from the snout, and four diameters and a quarter from the posterior angle of the opercle, with its inferior margin near the superior third of the head. The nostrils are near together; the posterior is rather the larger,

sub-round, and situated on a plane above the orbit, and behind its anterior border; the anterior is round, nearer the mesial line, and is vertical with the front of the orbit. The mouth is of moderate size; the lips are tolerably thick and fleshy, and the upper is very protractile; the lower jaw projects considerably beyond the upper, and both are armed with several series of villiform teeth, and with an external row of conical, pointed teeth of much larger size, and directed backwards; of these there are about thirty in the upper, and thirty-four in the lower jaw. The vomer and palatine bones are smooth and unarmed. The tongue is large, broad, thick, flat, fleshy, and tolerably free and rounded in front. There are six branchial rays, the inferior of which is small.

The pre-opercle is round at its angle, the ascending border nearly perpendicular, and with serratures so strongly marked below as to resemble spines. The opercle is rather large, and terminates posteriorly in two broad points, not readily seen in the recent specimen, as they are concealed by a loose fold of skin. The inter-opercle is broad, and covered with a row of eleven scales, which are not ciliated behind. The snout and lips are smooth, but the head above the nostrils is covered with small scales, and the opercle and pre-opercle with larger ones, those of the former being largest of all, though less in size than the scales of the body.

The dorsal fin is single, large and long; the anterior portion has twelve spines, the first of which is short; all are flattened at the sides, convex before and concave behind; and each has one-fifth of its latero-anterior border covered with a row of scales, though the membrane that unites them is smooth; these spines are all partially received in a furrow. The posterior portion has sixteen rays, rather stout at their roots, but they soon subdivide, and are partially covered with scales, as is their connecting membrane; of these rays, the seventh, eighth, ninth, and tenth are so prolonged as to make the posterior extremity of the fin round. The pectoral fin is small, short, rather broad, rounded behind, and extends to the posterior third of the ventral; it has fifteen rays that are covered with minute scales for about one third of their length. The ventral arises a little behind the base of the pectoral, terminates at the root of the ninth dorsal spine, and has one long,

stout spine and five soft rays. The anal fin is long, with three large spines; the anterior is short, and all are slightly convex before, and compressed laterally, and more or less received in a groove when the fin is closed; it has twelve soft rays, covered with scales, as well as the membrane that unites them; the sixth, seventh, eighth, and ninth rays are prolonged, as in the dorsal fin. The caudal is short but strong, with seventeen large rays, which soon subdivide, and are covered with scales nearly to their extremity.

The scales are large, sub-round, ciliated behind; there are fifty-two in the length and twenty-five in the elevation of the body. The supra-scapular is large and serrated, as is also the humeral. The lateral line at first runs nearly parallel with the arch of the back, though a little more convex in front, and a little more depressed opposite the soft portion of the dorsal fin.

COLOUR. This fish when first taken from the water is light silver-grey, but it soon becomes darker, and almost black above; the lower jaw and cheeks near the eyes are strongly tinted with yellow, and occasional blotches of a similar tint are seen along the back and shoulders; the spinous portion of the dorsal fin is olive, more or less clouded, and interspersed with yellowish shades, and dusky near its border; the lower half of the soft portion is clouded olive, with indistinct shades of yellow; its upper half and margin are nearly black; the pectoral fin is semi-transparent, with a slight yellow shade; the ventral is white, with dusky shades, and here and there yellow tints; the anal is coloured like the dorsal; and so is the caudal, but the latter is darker and without yellow tints.

DIMENSIONS. The head is one fourth the entire length; the greatest elevation without the dorsal fin is equal to one head and a half; total length, sixteen inches.

SPLANCHNOLOGY. The liver is large, and the central portion thin; the left lobe is long and slender, its anterior margin is sharp, with a deep fissure; the right lobe is the shorter, with its anterior border rounded. The gall-bladder is long, very narrow, and rests on the right lobe. The cystic duct is

long, and receives several hepatic ducts before it empties into the intestine. The stomach is oblong, large, extending through three fourths of the abdominal cavity ; its pyloric portion is very short and thick, with the pyloric contraction evident from without. There are four large, but very short, cæcal appendages. The small intestine at first runs towards the diaphragm, and thence to the posterior extremity of the stomach, whence it returns to the pylorus, to be again reflected, and terminate in the large intestine, after making a short convolution behind the stomach. The spleen is very large, almost round, and of a dark colour. The air-bladder is large, oblong, with its walls very thick below and thin above. The kidneys are large before, smaller behind, and the ureters open into a large bladder.

HABITS. This fish appears in the waters near Charleston in June, and remains with us until September; its food would seem to be various species of smaller fish, though portions of shells are sometimes found in its stomach, and it takes the hook readily, when baited either with clams or shrimps.

GEOGRAPHICAL DISTRIBUTION. The *Black Perch* inhabits the Atlantic coast of the United States, from New York to Florida.

GENERAL REMARKS. This fish bears so close a resemblance to the *Lobotes somnolentus* of Cuvier and Valenciennes, as at first sight to lead one to regard it as that species; but a more minute examination proves it to be a different animal, the *Lobotes Surinamensis* of Bloch. These two species, although they are closely allied and nearly alike in form, can yet be easily distinguished from each other:— in the former, the serratures at the pre-opercle are strong and separated, those at the angle are large, with their apices truncated, and the truncated margins are serrated; in the latter, the serratures of the pre-opercle are pointed, and those at its angle are so long as to resemble spines;— in the former, the scales of the lateral line have many arborescent tubes; in the latter, the tube is large and single, or only bifurcates at the posterior fourth of the scale.

The Black Perch was first described by Bloch, in his great work on Ichthyology, from a specimen taken at Surinam, and it needs but a glance at his figure to be convinced of the identity of his animal with ours, though the profile is not quite

so much incurved, and the colour is different, as it was done from a preserved specimen.

Dr. Mitchill's account of this fish was derived from a recent specimen caught in the harbour of New York, and it agrees well enough with the *Lobotes Surinamensis*, especially as regards the pre-opercle, which he says is "strongly aculeated, almost spinous." Yet he gives only eleven spines to the dorsal fin, and does not speak of the incurved profile, though it is slightly represented in his figure. He considered it an undescribed *Bodianus*, and applied to it the specific name *triurus*, from the form of the prolonged and rounded dorsal and anal fins, which, with the caudal, have, he says, "somewhat the appearance of three tails."

Dr. DeKay's description of the *Lobotes Surinamensis* agrees in the main with that of Dr. Mitchill, though it is more minute and extended. He gives twelve spines to the anterior dorsal, which is the exact number, and speaks of the "nape as rather prominent and somewhat concave behind the eyes," though this is not represented in his figure. In fact, neither Dr. Mitchill's nor Dr. DeKay's plates can be considered as good representations of this fish, as it appears in our waters, for in Dr. Mitchill's the profile is but slightly incurved, while in Dr. DeKay's it is straight, and both represent the anterior portion of the dorsal fin as nearly of the same elevation throughout its whole extent. If these characters and forms be constant, and are truly represented in their plates, then it is possible that their drawings may have been done from a fish different from ours, for which must be retained the specific name *triurus* of Dr. Mitchill, though I think it is most likely their draughtsmen were at fault.

GENUS LEIOSTOMUS. — *Lacépède*.

CHARACTERS. Snout convex, arched; pre-opercle smooth, or without serratures; inter-maxillary teeth minute; posterior pharyngeal teeth paved; two dorsal fins; anal spines minute; scales ciliated; branchial rays seven.

REMARKS. This genus was established by Lacépède to receive at first a single species found by Bosc in Carolina, and he applied to it the name *Leiostomus*,* from an erroneous opinion that the mouth was without teeth. Cuvier adopted the genus, though he adds to it three new characters: "minute denticulations at the pre-opercle; posterior pharyngeals paved; and an air-bladder, with slender cornua, as in *Otolithus*."

LEIOSTOMUS OBLIQUUS. — *Mitchill*.

Plate XXIV. Fig. 1.

SPECIFIC CHARACTERS. Body above lightest silver-grey, with a golden tint; fourteen or more dusky bars descend obliquely on the sides from the margin of the back, and disappear below the lateral line; a sub-oval black spot behind the opercle, above the pectoral fin; sides and belly yellow. D. 10-1-30. P. 18. V. 1-5. A. 2-12. C. 18.

SYNONYMES. *Mugil obliquus*, *Mitch.*, Report in part, p. 16.
Labrus obliquus, *Mitch.*, Trans. Lit. and Phil. Soc. N. Y., vol. i. p. 405.
Sciaena multifasciata, *Lesueur*, Mem. Acad. Nat. Scien. Phil., vol. ii. p. 225.
Leiostomus humeralis, *Cuv. et Val.*, Hist. Nat. Poiss., tom. v. p. 141, pl. 116.
Leiostomus obliquus, *DeKay*, Zoöl. N. Y., part iv. p. 69, pl. 60, fig. 195.
Leiostomus obliquus, *Storer*, Synops., p. 69.
Chub, *Vulgo*.

* From *λείος*, *smooth*, and *στόμα*, *mouth*.

DESCRIPTION. The shape of the *Chub* is sub-oval, compressed, gibbous or much arched above, and nearly straight below. The head is large, compressed at the sides, full, rounded above and in front, and covered with scales. The eye is very large, and placed about its diameter from the snout, and two diameters from the posterior angle of the opercle, with its inferior border near the median plane of the head; the pupil is dusky, the iris golden, intermixed with grey. The nostrils are near together; the posterior, which is rather the larger, is oval, very near the orbit, and extends obliquely downward and forward, to its inferior plane; the anterior is placed a little lower down.

The mouth is inferior, small, scarcely opening to the orbit, and has tolerably thick lips; the lower is shorter, and received within the upper. The upper jaw is protractile, and has several series of closely-set, minute, conical teeth; while the lower is smooth, unarmed, and received within the upper. The tongue is small, narrow, smooth, round before, and but slightly movable. The anterior pharyngeal bones are armed with numerous conical, pointed, card-like teeth; the posterior are furnished on their outer half with similar teeth, though rather longer; but their internal half is covered with short, broad teeth, rounded at their surfaces, and arranged like paving-stones. The pre-opercle is rounded at its angle, with its ascending border smooth or without serratures, and directed a little forward. The opercle ends behind in an obtuse angle. The gill-openings are of very moderate size; there are seven branchial rays.

There are two dorsal fins, though they are connected by a membrane slightly elevated; the anterior has ten delicate spinous rays, the first very short, the fourth and fifth longest; these are partially received in a groove; the posterior has one short spine and thirty soft rays, connected by a semi-transparent membrane, and covered with scales at their roots. The pectoral fin is broad at its origin, but terminates in a point anterior to the vent, and has eighteen rays, with a fold of skin in the axilla above. The ventral is short; it begins behind the root of the pectoral fin, and terminates before it in a short, delicate filament, and has five rays. The anal fin arises opposite the tenth dorsal soft ray, and has two spines, the

anterior very minute, and twelve soft rays, the first and second longest. The caudal is short, broad, slightly lunated, and has eighteen rays covered with small scales for half their extent.

The scales are nearly quadrilateral, a little rounded posteriorly, though they are so disposed on the body as to appear sub-rhomboidal. The lateral line follows nearly the arch of the back to the anterior fourth of the second dorsal fin, whence it descends to the middle, and is thus continued.

COLOUR. The head is dusky above; the cheeks are yellowish, with exceedingly minute dusky points; the body is of the lightest silver-grey, with a golden tint along the back; the sides and belly are yellow; fourteen or more dusky bars descend obliquely forwards from above, and become effaced on the sides below the lateral line; a sub-round dark spot behind the opercle and above the pectoral fin is always present; the anterior portion of the dorsal is transparent, with numerous minute dusky points; the soft portion is nearly the same, but with the spots arranged below in lines more or less distinct; the pectoral fin is transparent, with minute dusky spots only on its posterior part; the ventral is yellow before and white behind; the anal fin has its posterior half perfectly transparent or white, but in front it is semi-transparent, tinted with yellow, and marked with dusky points; the caudal fin is dusky at its root, with a yellow tint on its posterior half.

DIMENSIONS. The length, from the opercle to the tip of the tail, is rather more than three heads. The greatest elevation is equal to seven eighths of a head, excluding the dorsal fin, and one head and a half with it.

SPLANCHNOLOGY. The peritoneum is very dusky within, and silvery without. The liver is large, the central portion thin; the left lobe is thick, and extends through three fourths of the abdominal cavity; the right is also thick, but not more than half as long, and both are marked with fissures. The gall-bladder is large, conical, and very long, as it extends to the vent; its greater portion is behind the right lobe of the liver, and a small part only is lodged on its superior face. The stomach is an elongated, conical sac, smaller than the œsophagus, resembling one of the cœcal appendages, but

of larger size. The pyloric portion is even larger than the stomach itself, from which it departs at a right angle. There are eight cœcal appendages, not as large, but about as long, as the stomach. The small intestine runs nearly to the vent; it then returns to the cœcal appendages, whence it is reflected backwards to terminate in the rectum, with a very distinct valve. The spleen is dark purple in colour, and of small size; its posterior extremity being on a line with the rectal valve. The testes are oblong, narrow, extend about half the length of the abdomen, and unite far behind into one. The air-bladder is small, narrow, lanceolate, and extends throughout the whole length of the abdominal cavity. The kidneys are small and narrow; there is no urinary bladder.

HABITS. This fish appears on our shores in April, and remains until December, and still later in mild seasons. It feeds on smaller fish, and various other marine animals, as fragments of shells are frequently found in its stomach. Great numbers are brought to our market during the summer months, though its flesh has but little flavour; yet in New York, where its food may be of a better quality or more abundant, it is held in good estimation.

GEOGRAPHICAL DISTRIBUTION. The *Leiostomus obliquus* is known to inhabit the Atlantic coast from Cape Florida to Rhode Island, but I have no evidence of its existence beyond these limits, either north or south.

GENERAL REMARKS. Dr. Mitchill, who first described this fish, considered it a mullet (*Mugil obliquus*); but he afterwards changed this opinion, and placed it in the genus Labrus, retaining, however, his specific name *obliquus*, from its dusky bars. Cuvier and Valenciennes arranged it in the genus Leiostomus, with the specific name *humeralis*, from the oval dusky spot on the shoulder, though they were aware of that previously applied to it by Mitchill; Dr. DeKay has, however, restored his prior and appropriate specific name.

GENUS HOMOPRION.* — *Holbrook*.

CHARACTERS. Small, villiform, card-like teeth in both jaws; upper jaw with an external row of larger, conical and pointed teeth; pharyngeal teeth not paved; preopercle with large, radiating serratures or spines at its angle; branchial rays seven.

HOMOPRION LANCEOLATUS. — *Holbrook*.

Plate XXIII. Fig. 1.

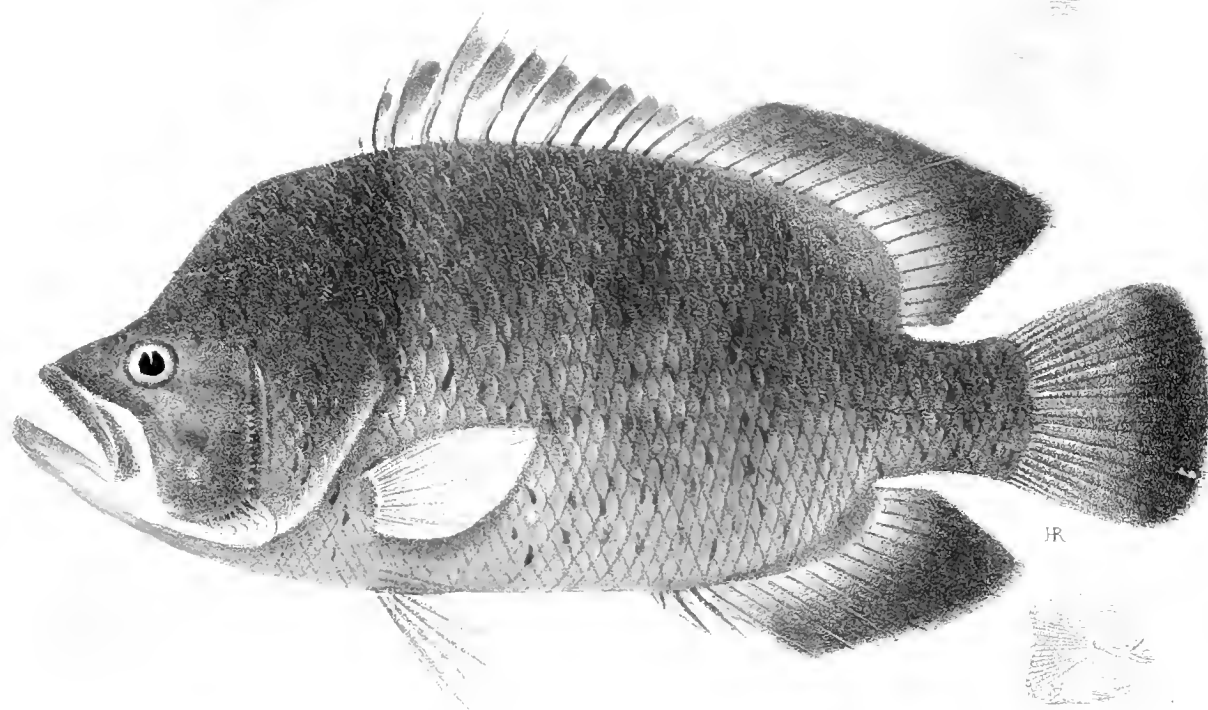
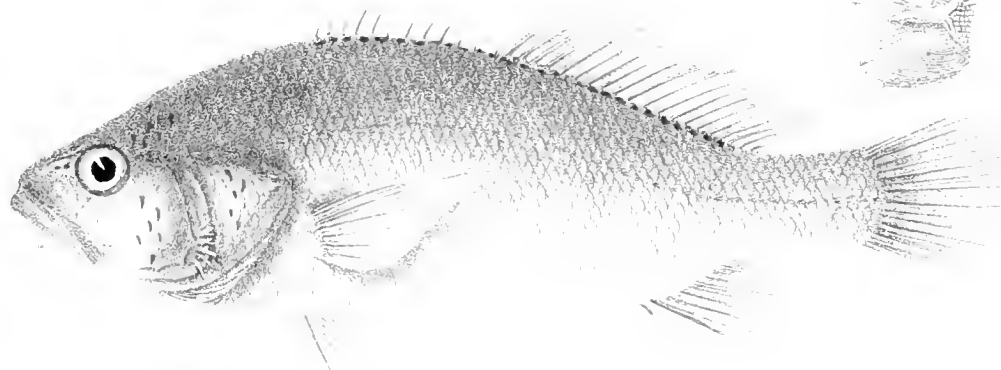
SPECIFIC CHARACTERS. Tail lanceolate; body above silvery, with a pale bluish tint; a series of dark spots along the back, near the root of the dorsal fin; tail yellow. D. 11 – 1 – 21. P. 16. V. 1 – 5. A. 2 – 7. C. 16.

SYNONYMES.

DESCRIPTION. The head is large, broad above, and the snout is very full and rounded. The eye is of moderate size, and is placed one diameter of the orbit from the snout, and two diameters and a quarter from the posterior border of the opercle, with its inferior margin about the median plane of the head. The nostrils are closely approximated, and very near the orbit; the posterior and larger is sub-oval, the anterior is round, and in a line with the border of the orbit, and on a plane with the superior margin of the eye.

The mouth opens downwards and backwards, and is large, though the posterior extremity of the upper jaw extends only to the middle of the orbit. The upper jaw is armed with a row of rather stout, conical, recurved teeth, and within this are numerous small, card-like teeth; the lower jaw has one group of small, card-

* From *ὁμός*, *similis*, and *πίων*, *serra*.



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the air-bladder, and extends nearly as far back as the left lobe. The stomach is rather large, sub-conical, and pointed behind; its pyloric branch arises near the anterior extremity, and has a well-marked valve. The small intestine proceeds half the length of the abdomen, whence it is reflected forwards for a short distance, and then returns to end in the rectum; which is less capacious, but has thicker walls. The ovaries are large, oblong, and unite together far forward.

HABITS. We know nothing of the habits of this fish, except that it is always found in very deep water.

GEOGRAPHICAL DISTRIBUTION. The *Homoprion lanceolatum* has been hitherto observed only at the entrance of Port Royal Sound.

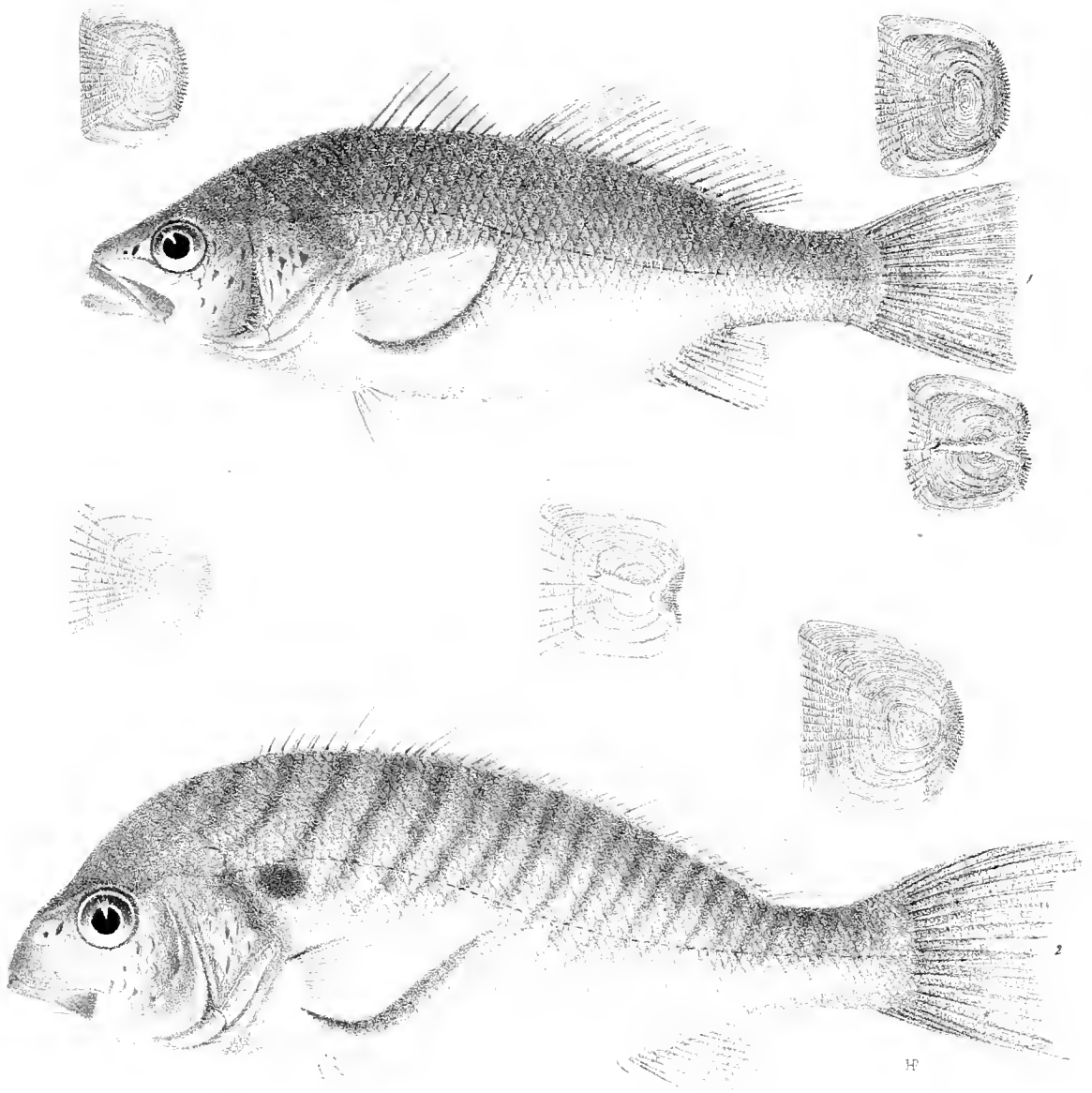
HOMOPRION XANTHURUS. — *Lacépède*.

Plate XXIV. Fig. 2.

SPECIFIC CHARACTERS. Body above palest golden-brown; below silvery-white, without spots or bars; tail yellow. D. 11 – 1 – 32. P. 21. V. 1 – 5. A. 2 – 13. C. 17.

SYNONYMES. *Leiostomus xanthurus*, *Lacép.*, Hist. Nat. Poiss., tom. iv. p. 439, pl. 10, fig. 1.
Leiostomus xanthurus, *Cur. et Val.*, Hist. Nat. Poiss., tom. v. p. 142.
Leiostomus xanthurus, *DeKay*, Zoöl. N. Y., part iv. p. 70.
Leiostomus xanthurus, *Storer*, Synops., p. 69.
Yellow-tail, *Vulgo*.

DESCRIPTION. The body is ovoid, elongated, and compressed, but much less arched at the back than in *Leiostomus obliquus*; it is straighter near the belly, and a transverse section is regularly oval. The head is of moderate size, and is covered with scales to the lips, which are exceedingly thin; the snout is rounded and full. The eye is large, longest horizontally, and placed near the facial outline, and about its diameter from the tip of the snout, and two diameters from the posterior border of the opercle; the pupil is dark, and the iris golden, with dusky blotches;



the nostrils are near together; the posterior and slightly larger is oval in shape, and very near the eye; the anterior is round.

The mouth is of moderate size, the upper jaw extending to the middle of the orbit; the lower is shorter than the upper jaw, and both are armed with two or three series of small, pointed, recurved, card-like teeth, with an outer row of larger, conical, pointed teeth, about fifteen in number; the largest teeth of this row are in front. The tongue is rather thick, narrow, and round in front. The pharyngeal bones are armed with numerous villiform and pointed teeth. The pre-opercle is slightly rounded at its angle, with its ascending border directed rather backward and finely serrated above, but it has large and radiating serratures at its angle. The opercle is emarginate behind, and terminates in two flat points, from which a fleshy fold is extended. The inter-opercle is short, broad, and semicircular. The gill-openings are large; there are seven branchial rays.

There are two dorsal fins, contiguous, and of considerable elevation; the anterior begins behind the root of the pectoral, and has eleven spines partially received in a groove; the posterior has one spine and twenty-one soft rays, standing in a groove, and partially covered near their roots with minute scales. The pectoral begins near the opercle, is short, and has fourteen rays. The ventral is rather large; it arises behind the root of the pectoral, and extends beyond it, and has one spinous and five soft rays. The anal is large, and begins on a line with the middle of the posterior dorsal fin, and terminates with it behind; it has two spines, the first short, and the second long and very stout; it has nine soft rays, the three or four last very short. The caudal is full, entire, or slightly longest in the middle, with minute scales on its membrane; it has seventeen rays.

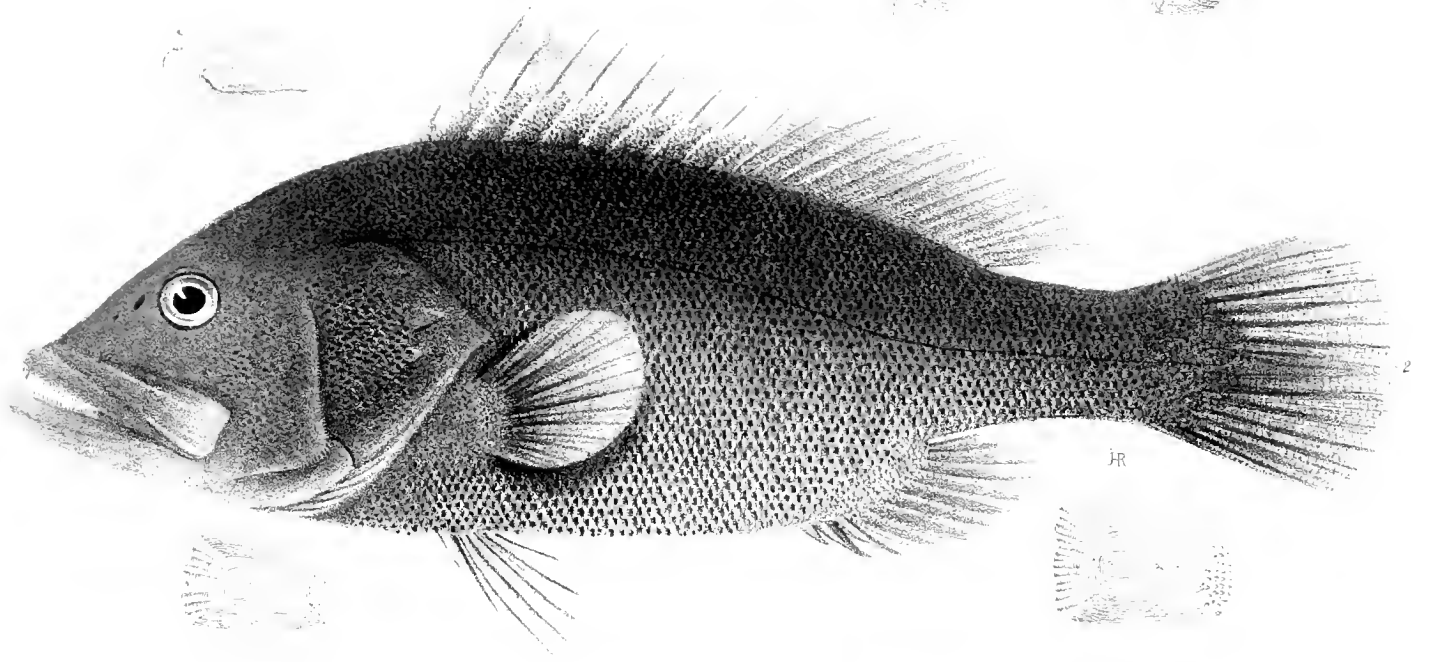
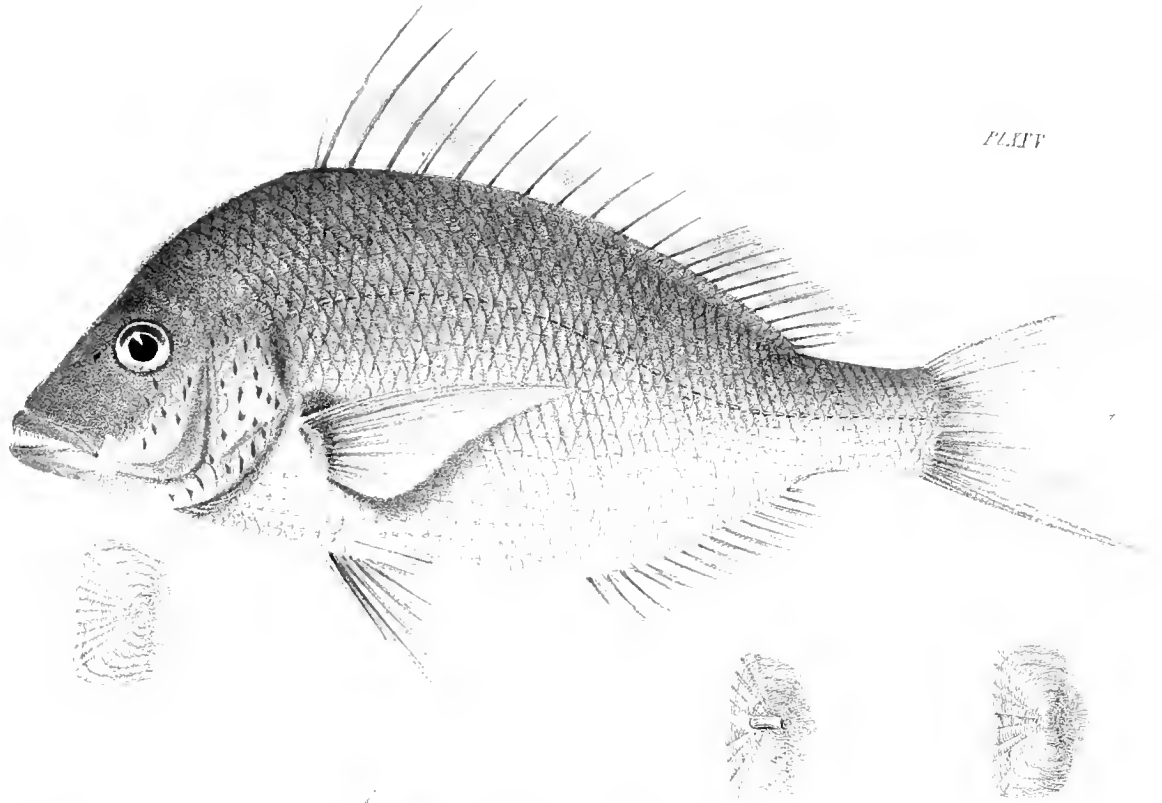
The scales are nearly semicircular, straight before, with fifteen radiating striæ, slightly undulating in their course; round and finely ciliated behind. The lateral line is at first concurrent with the outline of the back, and runs about the superior third of the body, to the middle of the soft dorsal, when it descends to the median plane, and thus continues to the tip of the tail; its scale is sub-quadrilateral, rounded behind, where it is ciliated and very slightly emarginate.

COLOUR. The head and the body above the lateral line are of a pale golden-brown; the cheeks, opercle, and body below the lateral line are silvery; the dorsal spines are white where they are covered with skin; the membrane uniting them is transparent, but has numerous dusky points in different places; the second dorsal is semi-transparent; the ventral is pale yellow in front, with its posterior half white; the pectoral is transparent; the anal spines are white; the anterior half of the fin is yellow, with a few black dots; its posterior is transparent and white; the caudal is yellow.

DIMENSIONS. The entire length, from the opercle to the tip of the caudal fin, is equal to three heads and one eighth, and the greatest elevation without the dorsal to one head; total length, ten inches.

SPLANCHNOLOGY. The peritonæum is of a silvery colour. The liver is large, and of a pale colour; it has two lobes, and a thin, flattened, narrow, transverse portion; the right and left lobes are nearly of the same size; the latter is rather the longer; both are flattened, narrow, with a sharp margin behind, and both project into the hypochondria along the horns of the air-bladder. The gall-bladder is small, sub-oval, and is in part lodged in a depression near the posterior part of the right lobe, though most of it is found behind the lobe. The stomach is very large, oblong, and extends to the posterior fourth of the abdominal cavity; its walls are tolerably thick, but not firm. The pyloric branch goes off very near the diaphragm, and is not half an inch long; the contraction at the pylorus is well marked externally. The small intestine is capacious, and runs backwards half the length of the abdomen, and is then reflected forwards nearly to the middle of the stomach, whence it turns backwards to end in the rectum, which is small. There are eight delicate, slender cæcal appendages, pointed at their tips, and of unequal length, varying from three lines to half an inch. The spleen is long and very slender. The air-bladder is large, and extends the entire length of the abdomen; it is pointed behind, and is so contracted in front as to appear almost double; from the anterior part goes off on each side a short, conical, capacious horn, towards the occipital bone; the walls are very thick, and the inner face has a satin-like whiteness, without any appearance of glandular masses. The kidney is long and narrow; there is no urinary bladder.

HABITS. The habits of the *Yellow-tail* are very similar to those of the *Leiostomus obliquus*; it is found in the same waters, and is taken with the same bait.



GEOGRAPHICAL DISTRIBUTION. This fish is found along the coast, from Cape Hatteras to Florida; its extreme northern limit remains yet to be determined.

GENERAL REMARKS. The Yellow-tail of Carolina is certainly the fish for which Lacépède established his genus *Leiostomus*, supposing it to be without teeth. His description was taken, according to Cuvier and Valenciennes, from notes and a drawing furnished him by Bosc. I have removed it from the genus *Leiostomus* because its jaws are not smooth, but are well armed with teeth; its pharyngeal teeth are not paved; its pre-opercle is not smooth, but strongly serrated at its angle; and its anal spine is of great size.

SERRANUS* NIGRITUS. — *Holbrook*.

Plate XXV. Fig. 2.

SPECIFIC CHARACTERS. Bluish-black above, with a few light-coloured spots; belly obscure white, with a bluish tint. D. 10-1-15. P. 18. V. 1-5. A. 3-10. C. 18.

SYNONYME. Black Grouper, *Vulgo*.

DESCRIPTION. The form of this fish is an elongated oval; it is thickest along the median plane, and thinner at the dorsal than at the ventral outline. The head is very large, and the snout rounded. The eyes are of moderate size, very near the facial outline, and about two diameters of the orbit from the snout, and three diameters from the spine of the opercle. The anterior nostril is the smaller; both are round, and on a line within the orbit, and on a plane near its superior third.

* Family Percidæ.

The mouth is very large; the lips, and especially the lower, is fleshy and thick; the inferior jaw is the longer, and makes a part of the facial outline when the mouth is closed. The upper jaw is armed with a broad group of conical, pointed, recurved teeth, those in front being the longest; on the outside of this group is a single row of larger teeth of the same form, but less recurved at their points; in front are four strong, stout, canine teeth. The lower jaw is armed like the upper, but it wants the outer larger row of teeth. The vomer has an angular patch, and the palate-bones have an oblong group of similar conical, pointed, recurved teeth. The pharyngeal bones are furnished with teeth similar in form and size to the smaller teeth of the upper jaw.

The pre-opercle is rounded slightly at its angle, and has its ascending border directed rather forwards; its angle and its border for some distance are serrated. The opercle is large, and terminates behind in three naked spines, from which a pointed fold of skin is continued backwards. The sub-opercle is intimately joined to the opercle. The inter-opercle is broad, and semicircular. The head above from the posterior margin of the orbits is smooth; the cheeks, jaws, and pre-opercle are covered with small scales, and the opercle with scales of larger size. The gill-openings are very large; there are seven branchial rays.

The dorsal fin begins in front of the termination of the opercle, and has ten spines, the anterior short, and fifteen branched rays. The pectoral is broad, and rounded; it begins nearly with the dorsal, and has eighteen rays. The ventral arises with the pectoral, but is shorter, and has one spine and five soft rays, the internal of which is joined to the belly. The anal has three spines, the anterior very short, and ten soft rays. The caudal is broad and rounded,* and has eighteen rays.

The scales are very small, closely adherent, quadrilateral, longest in the horizontal direction, and rounded and ciliated behind. The lateral line is concurrent

* It so appeared in the only specimen that I ever saw, which was somewhat mutilated.

with the dorsal outline, and runs above the middle third of the body; its scale is larger before, and is irregularly pointed behind; its duct is large and near the middle.

COLOUR. See *Specific Characters* for colour.

DIMENSIONS. The length from the opercle to the tip of the tail is equal to two heads and a half; the elevation opposite the pectoral, without the dorsal fin, is one head; total length, two feet.

HABITS. This animal is so seldom seen on our shores, that nothing can as yet be said of its habits.

GEOGRAPHICAL DISTRIBUTION. The *Black Grouper* has been observed, as far as I know, only in the waters of South Carolina.

GENUS PAGRUS.* — *Cuvier*.

CHARACTERS. Both jaws armed at their anterior part with four or six stout, conical incisor teeth, and with a double series of rounded molar teeth. Dorsal fin single. Branchial rays six.

PAGRUS ARGYROPS. — *Linnaeus*.

Plate XXV. Fig. 1.

SPECIFIC CHARACTERS. Body much compressed, arched or gibbous above; the second and third dorsal rays prolonged; colour silvery below; iridescent, and

* Family Sparidæ.

often with a greenish or bluish tint above. D. 13-12. P. 16. V. 1-5. A. 3-12. C. 17.

- SYNONYMES. *Sparus argyrops*, *Lin.*, *Sys. Nat.*, tom. i. p. 471.
Sparus argyrops, *Gmel.*, *Ed. Syst. Nat.*, tom. i. pars iii. p. 1277.
Sparus —, Poki, or Porgee, *Schoepff*, *Schrift. der Gesells. Nat. Freund.*, b. viii. st. ii. p. 153.
Sparus xanthurus, *Lacép.*, *Hist. Nat. Poiss.*, tom. iv. p. 120.
Sparus argyrops, *Shaw*, *Gen. Zoöl.*, vol. iv. p. 426.
Labrus versicolor, *Mitch.*, *Trans. Lit. and Phil. Soc. N. Y.*, vol. i. p. 404, pl. 3, fig. 7.
Pagrus argyrops, *Cuv. et Val.*, *Hist. Nat. Poiss.*, tom. vi. p. 164.
Pagrus argyrops, *Storer*, *Report, &c.*, p. 38.
Pagrus argyrops, *DeKay*, *Zoöl. N. Y.*, part iv. p. 95, pl. 9, fig. 25.
Pagrus argyrops, *Ayers*, *Bost. Jour. Nat. Hist.*, vol. iv. p. 260.
Pagrus argyrops, *Storer*, *Synops.*, p. 82.
Porgy, *Vulgo*.

DESCRIPTION. The form of this fish without the tail is nearly oval; much compressed and arched or gibbous along the dorsal outline, and thin or almost carinate in front of the dorsal fin; thicker and nearly straight at the belly. The head is short, but much elevated, and the facial outline slopes gradually to the snout, being only a little prominent at the orbits, where it is broadest; and the snout is very narrow, and long. The eye is large, near the facial outline; and is one diameter and a quarter of the orbit from the posterior margin of the opercle, two diameters from the snout, and two diameters from the angle of the pre-opercle. The nostrils are approximated and very near the orbit, and rather below its median plane; the posterior and much the larger is elliptical in form, the anterior is round.

The mouth is small, the posterior extremity of the upper jaw not reaching to the anterior nostril; the lips are tolerably thick, and the upper is very protractile; both jaws are armed with six incisor teeth, large, slightly compressed in the antero-posterior direction, and of these teeth the four internal are truncated; behind the incisors is a group of minute teeth. Each jaw has two rows of molar teeth, with their tips rounded or flattened; the teeth of the inner row are largest.

The pharyngeal bones are thickly studded with slender, conical, pointed, and recurved, card-like teeth. The pre-opercle is round at its angle, and crenated, or with radiating depressions and elevations, but is not serrated. The opercle is elevated, but narrow in the longitudinal direction, and terminates behind in an obtuse angle. The sub-opercle is oblong, and narrow. The inter-opercle is rounded below, and very broad. The whole head is naked above; but the cheeks nearly to the commissure of the mouth, and the sides of the head, are covered with scales.

There is a single dorsal fin, placed in a groove of scales, and preceded by a short, recumbent spine; it begins nearly with the origin of the pectoral, and has thirteen spines and twelve branched rays; of the spines the anterior is short, the second and third are very long, and are still further prolonged by filaments, which are, however, so fragile, as to be seldom seen except in fish recently caught. The pectoral is narrow, long, terminates behind the beginning of the anal, and has sixteen rays, with a supplementary scale above, which is half as long as the fin. The ventral begins behind the origin of the pectoral, and terminates at the root of the anal; it has one spine and five soft rays, the first and second slightly prolonged. The anal arises rather behind the root of the first dorsal soft ray, and has three spines received in a groove of scales; the first spine is short, the second and third are long; it has twelve soft rays. The caudal is rather large, forked, and has seventeen rays.

The lateral line follows nearly the dorsal outline, and is above the middle third of the body; its scale is longest vertically, and has a short, large tube near its middle.

COLOUR. See *Specific Characters* for colour.

DIMENSIONS. The length, from the opercle to the tip of the caudal fin, is equal to three heads; the greatest elevation without the dorsal fin, to one head and a half; total length, fourteen inches.

SPLANCHNOLOGY. The liver is large, and consists of two lobes, with a transverse portion; the left lobe is long, reaching nearly to the vent; the right lobe, and the central or transverse portion, are about half as long. The gall-bladder is an elongated cone, and extends nearly as far back as the left lobe. The stomach is long, broad, conical; its pyloric branch arises far forwards, and is thick and stout. The small intestine runs nearly to the vent, and is then reflected forwards to the pylorus, whence it returns to end in the rectum, which is more capacious, and has much thicker walls. There are four stout, but rather short, cæcal appendages, and the intestine is somewhat dilated after their entrance. The air-bladder is large, oblong, and extends throughout the abdomen; from each anterior corner arises a horn, that runs upwards, outwards, and then backwards on the outer surface of several of the anterior ribs. There is no urinary bladder.

HABITS. The *Porgy* prefers deep and clear waters, with rocky bottoms, though it is often found in waters of a very different character; it feeds on various kinds of shell-fish, and parts of smaller fish are also not unfrequently found in its stomach.

GEOGRAPHICAL DISTRIBUTION. The *Porgy* is found along our coast at all seasons of the year, though it is most abundant in June and July; its southern limit on the Atlantic border is Cape Florida, and its northern is in the neighbourhood of Cape Cod, it being very abundant in the Vineyard Sound. Dr. Storer says, attempts have been made to introduce this animal into Massachusetts Bay, near Boston, but with little success. But it is possible that it may in time become accustomed to those waters; for he observes, — “Within a few years small numbers have appeared north of the Cape, and are now yearly captured at Wellfleet and Sandwich.”

GENERAL REMARKS. This animal was first described by Linnæus as the *Sparus argyrops*, and his specific name has been retained by all the best ichthyologists since his time.

FAMILY ELOPIDÆ. — *Valenciennes*.

CHARACTERS. A sub-lingual bone, as in *Amia*, placed between the branches of the inferior maxillary; branchial rays very numerous; inter-maxillaries small; superior maxillaries long and free; minute teeth on the inter-maxillary, maxillary, palate, pterygoid, vomer, sphenoid, hyoid, and pharyngeal bones; cœcal appendages numerous; air-bladder large, and communicating with the stomach. This family was established by Valenciennes, and embraces at this time but two genera, *Elops* and *Megalops*.

GENUS ELOPS. — *Linnaeus*.

CHARACTERS. Head covered with a thick skin, without scales; a double nictitating membrane descending over the cheeks; body elongated, sub-round; dorsal fin nearly in the middle, with its last ray prolonged; dorsal and anal fins covered with scales at their base; caudal deeply forked, and with a large scale or spine both above and below its root; branchial rays thirty.

ELOPS SAURUS. — *Linnaeus*.

Plate XXVI. Fig. 2.

SPECIFIC CHARACTERS. Body elongated, sub-cylindrical, compressed towards the tail, palest blue above, silvery at the sides and belly; head pale greenish above, white at the sides, with a roseate tint; upper jaw longer than the lower; caudal widely forked, with a large scale or spine above and below its root. D. 24 P. 18. V. 15. A. 17. C. 28.

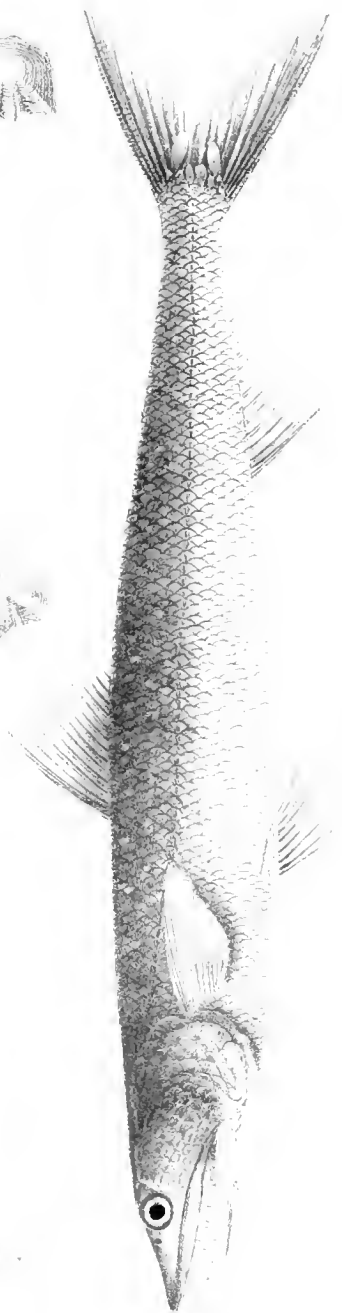
- SYNONYMES. *Elops saurus*, *Lin.*, Syst. Nat., tom. i. p. 518.
Argentina Carolina, *Lin.*, Syst. Nat., tom. i. p. 518.
Elops saurus, *Gmel.*, Ed. Syst. Nat., tom. i. pars iii. p. 1394.
Argentina Carolina, *Gmel.*, Ed. Syst. Nat., tom. i. pars iii. p. 1395.
Mugilomora Anne-Caroline, *Lacép.*, Nat. Hist. Poiss., tom. v. p. 398.
Argentina Carolina, *Lacép.*, Hist. Nat. Poiss., tom. v. p. 369.
Elops saurus, *Shaw*, Gen. Zoöl., vol. v. p. 125.
Elops inermis, *Mitch.*, Trans. Lit. and Phil. Soc. N. Y., vol. i. p. 445.
Elops saurus, *Cuv. et Val.*, Hist. Nat. Poiss., tom. xix. p. 365.
Elops saurus, *DeKay*, Zoöl. N. Y., part iv. p. 267, pl. 41, fig. 131.
Elops saurus, *Storer*, Synops., p. 211.

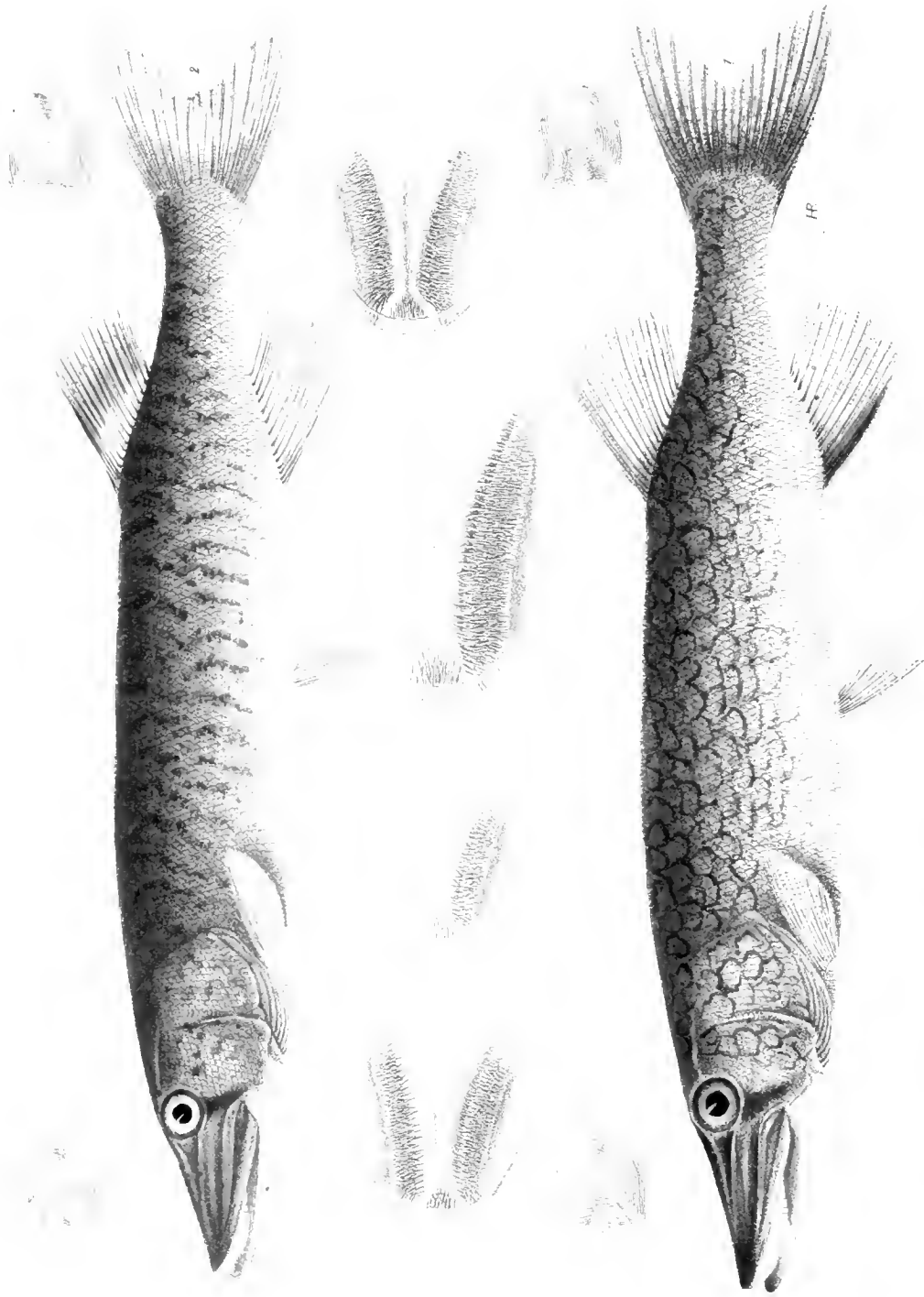
DESCRIPTION. The body is very much elongated, sub-cylindrical, round at the back, slightly flattened at the belly, and as slightly compressed at the sides. The head is long and thick, with the snout full and rounded; the supra-orbital ridges are elevated, and leave a deep, broad, oblong depression on the vertex, which is broadest between the eyes, and very narrow behind; the orbit of the eye is marked above with parallel ridges and depressions, directed from within outwards.

The eye is very large, and placed near the facial outline, with its inferior margin near the median plane of the head, and about its diameter from the snout, and two diameters and a quarter from the posterior border of the opercle; the pupil is deepest blue; the iris is silvery, with a nictitating membrane both before and behind, which leaves a vertical, elliptical opening; this membrane extends for a considerable distance over the cheeks. The nostrils are closely approximated, and rather nearer to the eye than to the snout; the posterior is semilunar in shape, and much the larger; the anterior is round, and both are at the anterior extremity of the supra-orbital ridge.

The mouth is very large, as the posterior extremity of the upper jaw extends behind the orbit; the lower jaw seems longer than the upper when the mouth is open, but is in fact received within it when the mouth is closed; the upper jaw has no lip, but the lower has a loose fold of skin on its posterior half; both are armed with numerous series of minute, rasp-like teeth; the band in the

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inter-maxillary is narrow; that of the superior maxillary is broader, and extends on the outer as well as the inner margin of the bone; the band of the lower jaw is narrow behind, and broad before; the vomer, the palate, the sphenoidal and the pharyngeal bones, are all furnished with similar teeth. The tongue is short, round in front, and rough on its posterior part with minute teeth. The lower jaw has an elongated sub-lingual bone attached in front between its branches.

The pre-opercle is narrow, and ascends high up; it is rounded behind, and prolonged at its angle, which descends as low as the sub-opercle. The opercle is sub-quadrilateral, with its inferior and posterior angle prolonged. The sub-opercle is ensiform in shape, but broad, with its point turned upwards and backwards. The gill-openings are large; there are thirty-three branchial rays.

The dorsal fin is single, semi-falcate, and is near the middle of the back; it has twenty-two rays, the first very short, and the fourth, fifth, and sixth longest; they are placed in a sheath of the integuments which ascends for some distance, but without any adhesion. The pectoral begins under and in front of the termination of the opercle, and has eighteen rays, with an elongated scale in the axilla above. The ventral is stout, and begins rather before the origin of the dorsal; it has fifteen rays, with a supplementary plate above, three fourths as long as the fin itself. The anal is short, sub-falciform, and has fourteen rays, the two anterior short, and all have their roots in a sheath, like those of the dorsal fin. The caudal is long, deeply forked, and has twenty-eight rays, with a lanceolate scale both above and below its root.

The scales are caducous, exceedingly thin, sub-quadrilateral, round, and ciliated behind, slightly scalloped before, and marked with nine radiating striæ. The lateral line at its anterior part is straight, and runs nearly along the upper third of the body, but it descends to the median plane between the pectoral and ventral fins. Its scales are small, sub-quadrilateral, and the posterior margin is least extensive and ciliated, with both the superior and inferior borders incurved; the tube is near the middle of the scale.

COLOUR. The head is pale green above, and white with often a roseate tint at the sides; the body is palest blue above, or with a faint greenish tint, and silvery at the sides and belly. The dorsal fin is semi-transparent, of light olive-colour, with minute dark spots; its three or four anterior rays are alone clouded and dusky; the pectoral is semi-transparent, white below, of a yellowish tint above, and with minute dusky points; the ventral is also white, with a pale yellow tint above, and numerous minute dusky points; the anal is white in front, and pale yellow behind; the caudal is light olive-brown, especially near its tip.

DIMENSIONS. The entire length, from the opercle to the tip of the caudal fin, is equal to four heads and a quarter; the greatest elevation without the dorsal fin is rather more than two thirds of the head; total length, thirty inches.

SPLANCHNOLOGY. The peritoneum is very thin, delicate, and of a silvery colour. The liver is large, dark reddish-brown, and very firm; it is simple, or undivided into lobes, at least on its ventral surface, though imperfect marks of separation may be seen on its dorsal; it is situated mostly on the left side, and does not extend beyond the anterior fourth of the abdomen; there is, however, a depression in front, which makes it appear slightly heart-shaped, and a small nipple-like process extends from the right side above, towards the œsophagus. The gall-bladder is large, though concealed by the right portion of the liver; the bile is remarkably green. The stomach is long, conical, broadest in front, and so slender behind its pyloric branch as to resemble a lumbrical worm; its muscular walls are thick, and its mucous membrane has numerous longitudinal folds, some of which extend its whole length, even to the pointed extremity behind; the pyloric portion is short; it departs in front of the middle of the stomach, and runs nearly to the diaphragm, where it ends in the small intestine; its walls are thicker and firmer than those of the body of the stomach, though its mucous membrane has similar folds; the pyloric valve is well marked. The small intestine runs nearly straight towards the vent; its anterior portion is largest where it receives the openings of the cœcal appendages, which are numerous, slender, and collected together in a mass. The rectum is short, but more capacious than the small intestine; its mucous membrane is finely reticulated, and the rectal valve is moderately developed. The testicles when empty are long and thin; they are placed on the air-bladder, and in contact with each other on the mesial line behind; in the female, the oviducts unite near the cloaca. The air-bladder is very long, as it extends not only throughout the whole length of the cavity of the abdomen, but terminates in two small, conical horns in front, on each side of the first dorsal vertebra, near the occipital bone; its walls are fibrous, silvery, and white; it communicates with the stomach by a very short canal on its dorsal aspect.

HABITS. The *Elops saurus* approaches the shores of Carolina in the months of June and July, and remains until November; it feeds on smaller fish, whole skeletons of which are sometimes found in its stomach.

GEOGRAPHICAL DISTRIBUTION. This animal is found on our coast only from New Orleans to New York; though its range, according to Valenciennes, is much more extensive, it being common not only to the American and European shores of the Atlantic, but to the Pacific and Indian Seas.

GENERAL REMARKS. This fish was first accurately described by Linnæus, from specimens furnished him by Dr. Garden.

FAMILY SALMONIDÆ. — Cuvier.

CHARACTERS. Body more or less scaly; two dorsal fins, the anterior with articulated rays; posterior small, adipose, and without rays; cœcal appendages numerous; air-bladder more or less developed; great variation in the *armature* of the jaws; branchial rays vary much in number.

GENUS SAURUS. — Cuvier.

CHARACTERS. Body elongated; mouth large; inter-maxillary long, rounded, and ending in a point; superior maxillary small, concealed, or confounded with the inter-maxillary; teeth numerous, conical, pointed, more or less recurved, or sometimes lanceolate in both jaws; palate-bones, tongue, hyoid and pharyngeal bones armed with smaller teeth; branchial rays eighteen.

SAURUS FÆTENS. — *Linnaeus*.*Plate XXVI. Fig. 1.*

SPECIFIC CHARACTERS. Head short, broad behind, vertex canaliculated, snout pointed; mouth large; fauces and branchial rays sulphur-coloured; body elongated, sub-cylindrical, mottled, olive-brown above, belly white. D. 11. P. 18. V. 1-5. A. 10. C. 24.

SYNONYMES. *Salmo fætens*, *Lin.*, Syst. Nat., tom. i. p. 513.

Saurus ex cinereo nigrescens, *Cates.*, Carol., &c., vol. ii. pl. 2, fig. 2.

Salmo fætens, *Gmel.*, Ed. Syst. Nat., tom. i. pars iii. p. 1385.

Salmo fætens, *Shaw*, Gen. Zoöl., vol. v. part i. p. 67.

Osmerus albidus, *Lacép.*, Hist. Nat. Poiss., tom. v. p. 235.

Saurus fætens, *Cuv. et Val.*, Hist. Nat. Poiss., tom. xx. p. 471.

Providence Whiting, *Vulgo*.

DESCRIPTION. The head is broad, and triangular if seen from above, with the snout pointed; the vertex is depressed, and even concave between the orbits, which are very prominent. The eye is of moderate size, and is placed one diameter and a half of the orbit from the snout, and three diameters and a half from the opercle; it is midway between the anterior and posterior extremities of the upper jaw, with its lower border rather above the median plane of the head. The nostrils are near the orbit; the posterior and larger is sub-round.

The mouth is of great size, the extremity of the upper jaw extending more than half the distance between the snout and posterior border of the opercle; the lower jaw is shorter than the upper, and smaller, so that it is everywhere received within it, when the mouth is shut, so as to leave the teeth of the latter exposed. The upper jaw is armed with numerous strong, pointed, conical teeth, placed in two or three rows; the lower is furnished with a broad group of similar teeth, placed in several series, and of these teeth those of the internal row are largest. The palate-

